

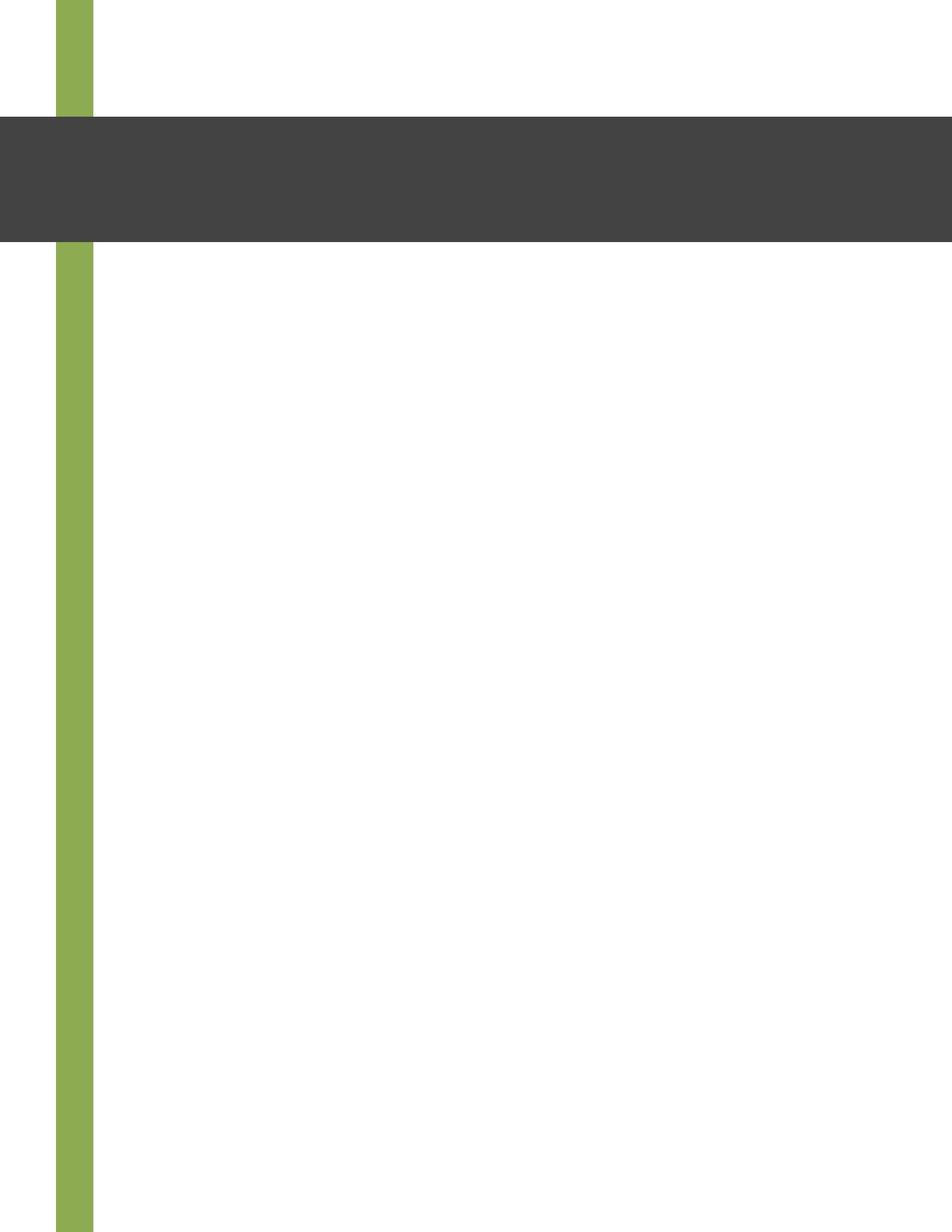


Thesis Book

# **Wayfinding in Virtual Reality**

Wayfinding Through the Lens of Virtual Reality in  
Videogame Design

M. Arch. Thesis By Alyssa Zachman



# Wayfinding in Virtual Reality

Wayfinding Through the Lens of Virtual Reality in Videogame Design

A Design Thesis Submitted to the  
Department of Architecture and Landscape Architecture  
North Dakota State University

by  
Alyssa Marie Zachman

In Partial Fulfillment of the Requirements for the Degree of  
Master of Architecture

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Primary Thesis Advisor

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Thesis Committee Chair

May 2017  
Fargo, North Dakota

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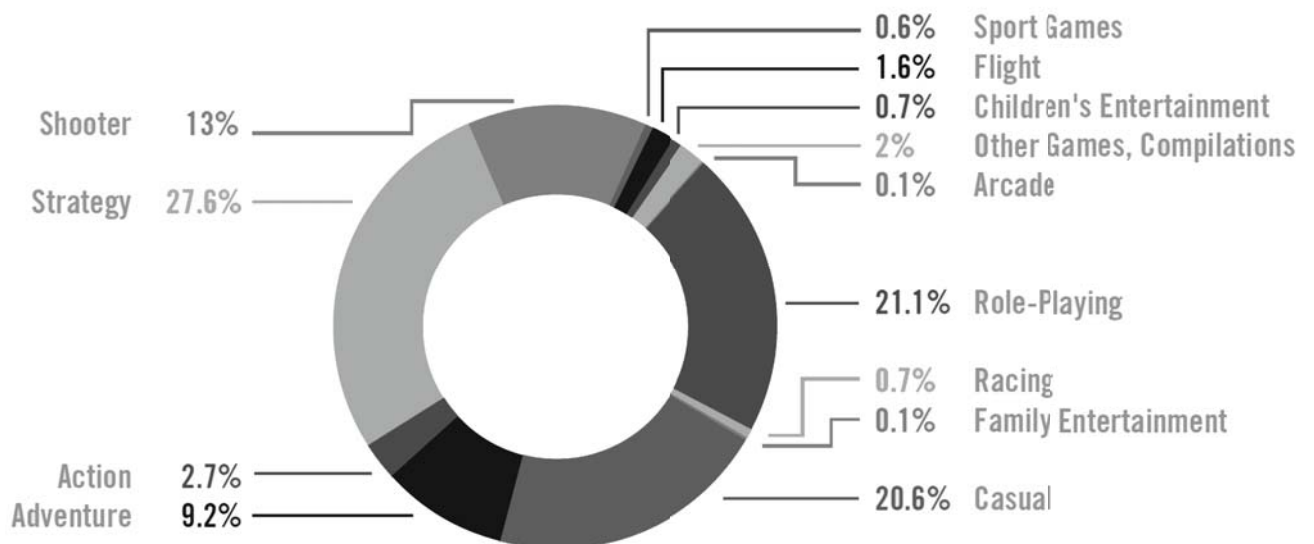
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## Best-Selling COMPUTER GAME Super Genres by Units Sold, 2011



Source: The NPD Group/Retail Tracking Service

Figure One



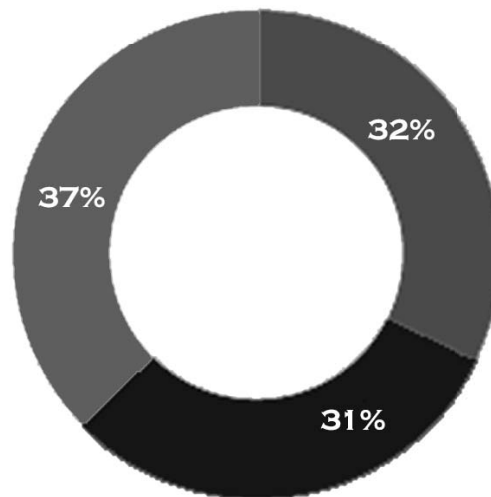
Figure Two

# 49%

of U.S. households own a dedicated game console,  
and those that do own an average of 2

The average game player age is:

# 30



## AGE

OF GAME PLAYERS

32% UNDER 18 YEARS

31% 18-35 YEARS

37% 36+ YEARS

Figure Three

## Gamers per "Platform"

Absolute and Relative Multi-Platform Behavior (US)

Number of Different  
"Platforms" per Gamer

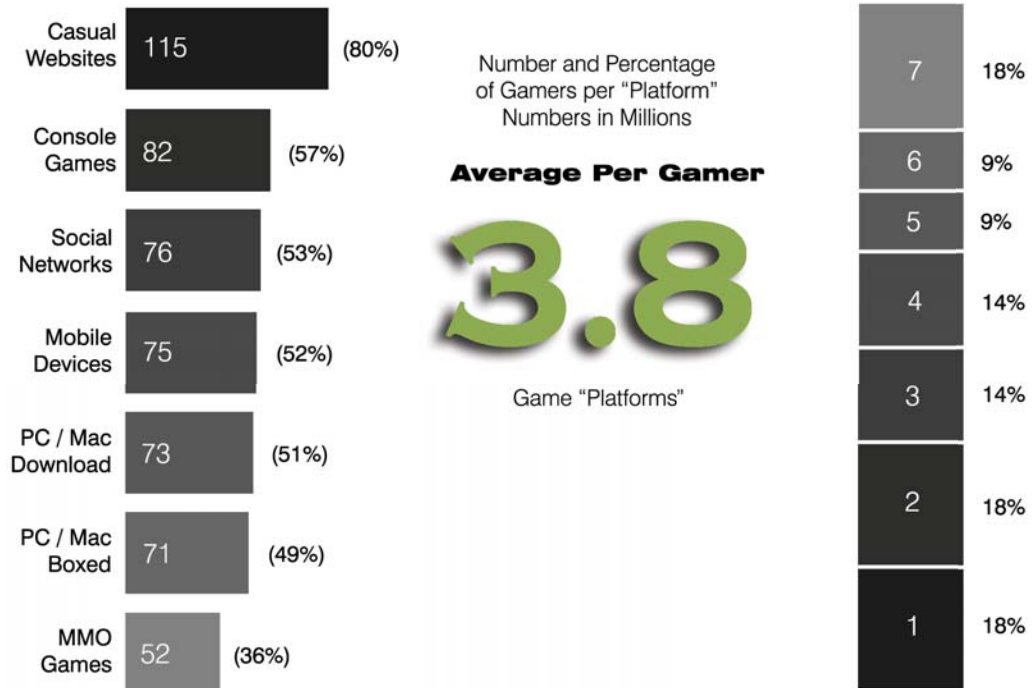


Figure Four

## TIME SPENT ON GAMES

TOTAL AND BY 'PLATFORM' IN HOURS PER DAY (US)

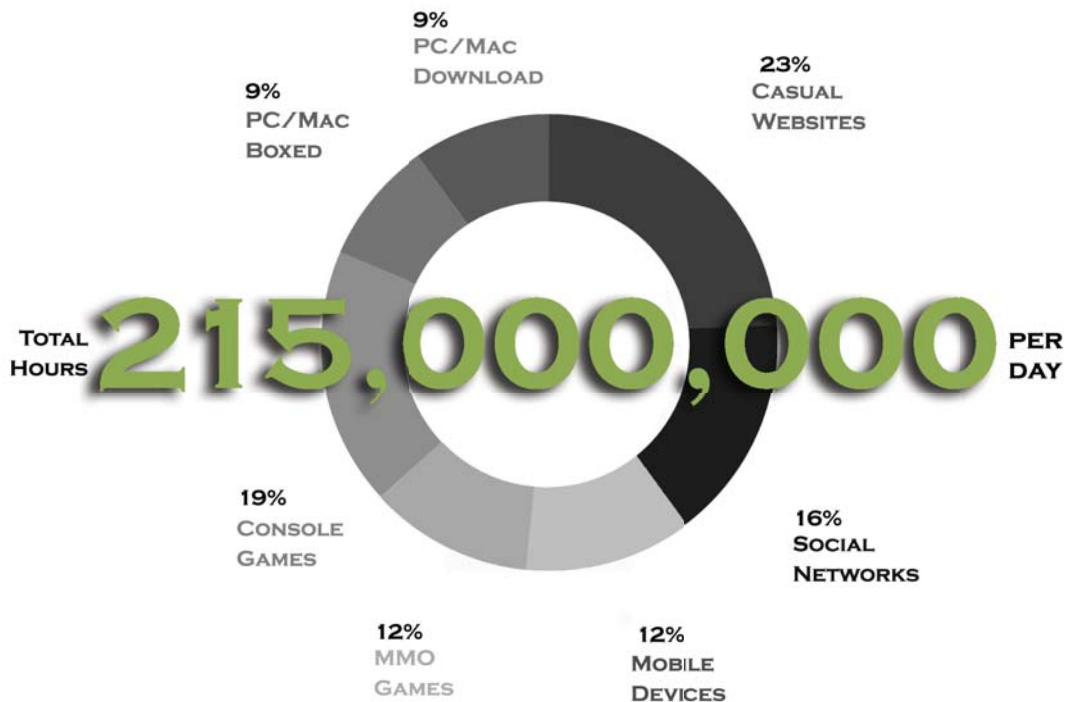


Figure Five

# 145,000,000

## ACTIVE GAMERS IN THE US

HIGH-LEVEL GAME FACTS FROM THE US NATIONAL GAMERS SURVEY, JUNE 2011

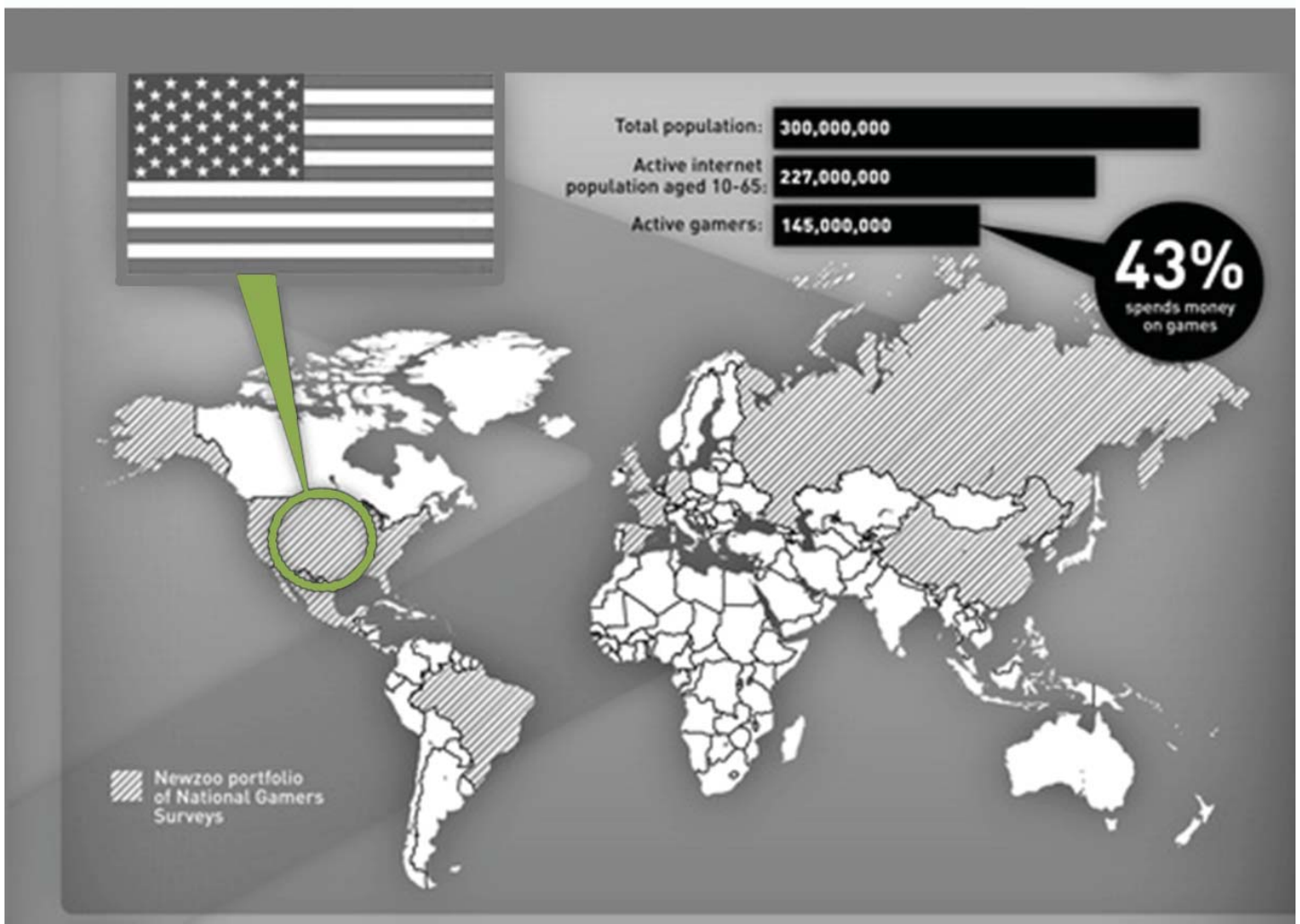
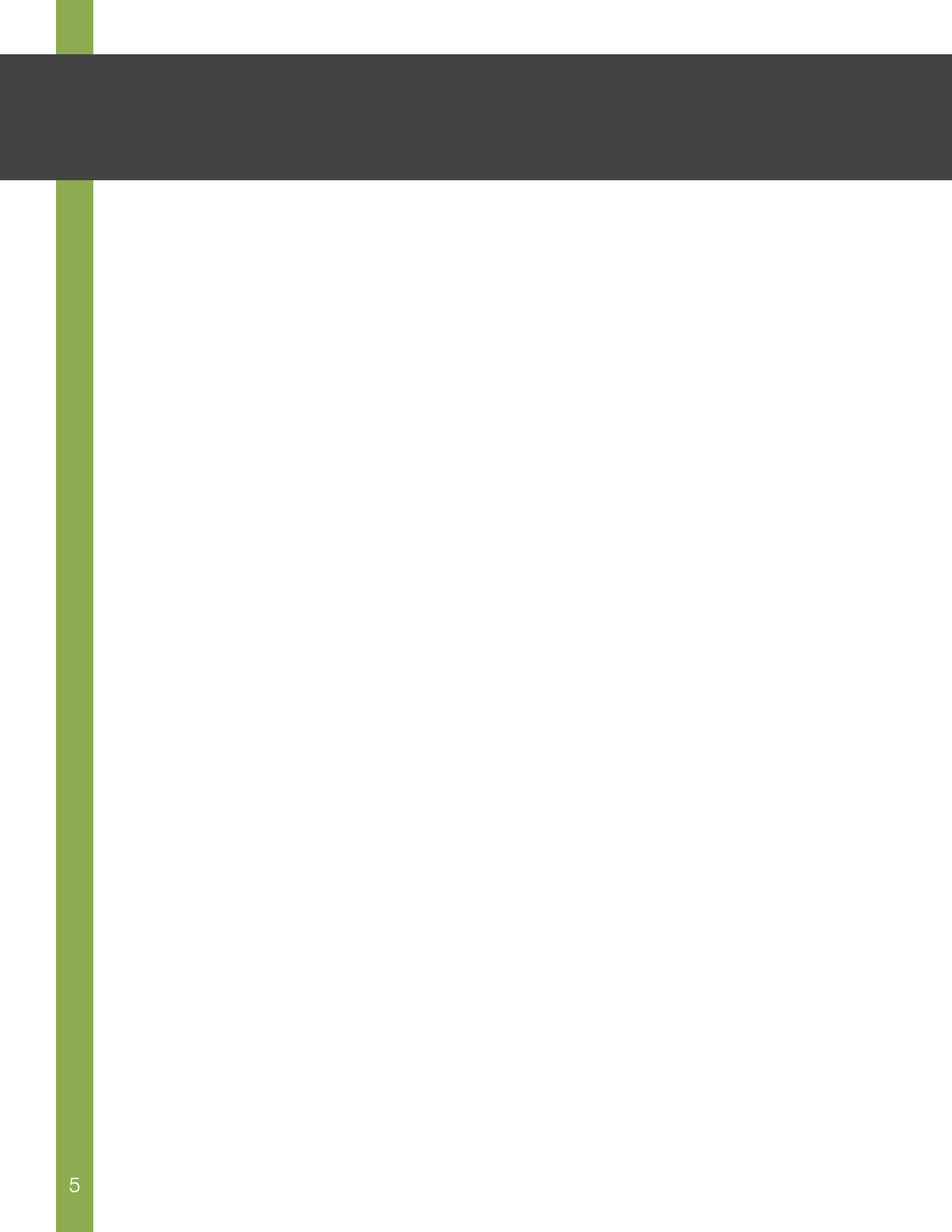


Figure Six

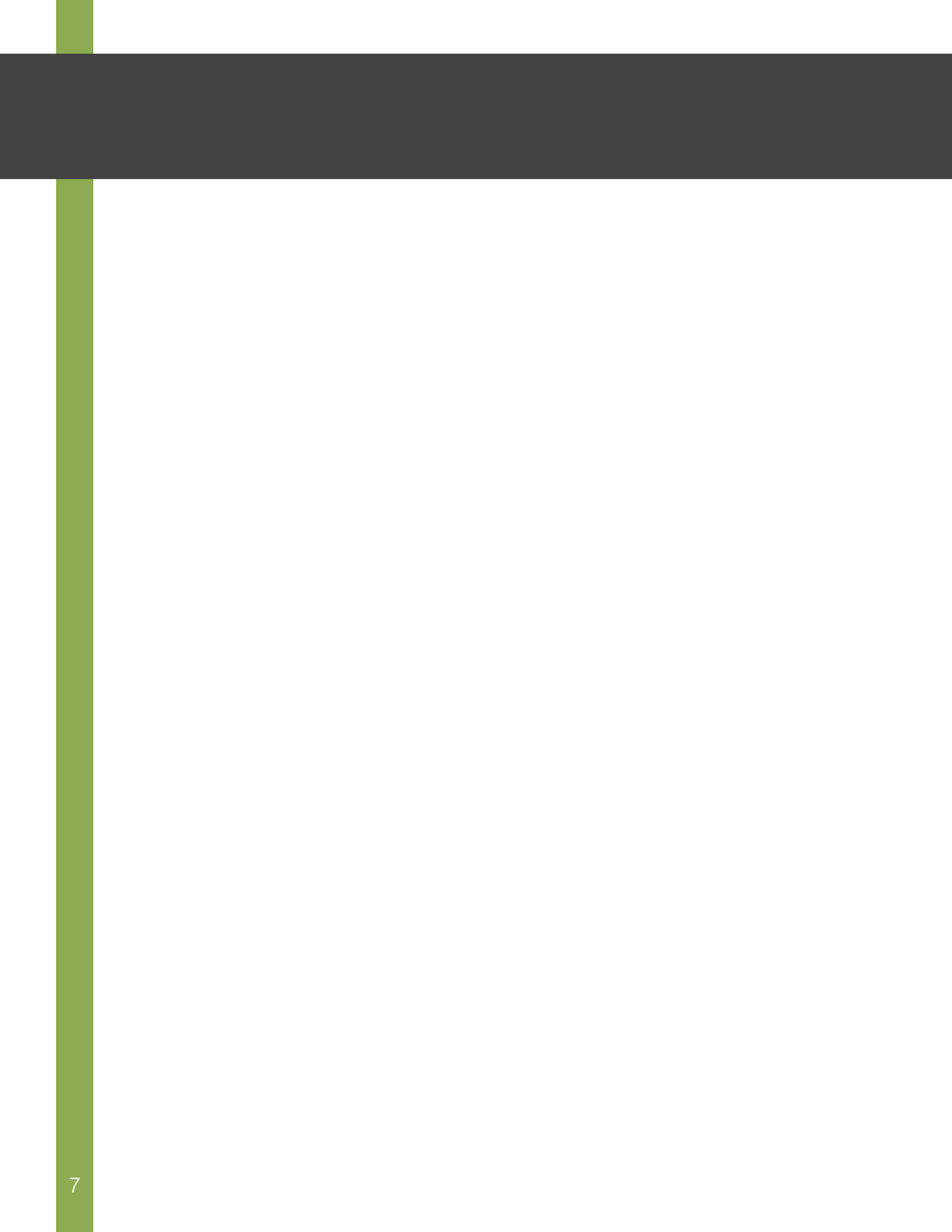


This thesis, Virtual Architecture: application of architectural design within the realm of video games and virtual realities, examines and challenges how architecture is viewed in a simulated setting by its users as well as how its creation can be an aid or detriment. These virtual environments are just as important to people within the realm of video games as their tangible counterparts, and are expected to have similar interactions with each. In the future, it may also be the case that humans find themselves in a constant virtual reality in which they live their lives. It is important for architects and other designers to start early in designing these interfaces to improve their quality and ability to be interactive and as close to real world interaction and tangibility as possible. Architects are the key to these looming possibilities and can make for virtual realities that are well designed, dynamic, realistic, and are as interactive as seemingly possible with the technology that we already possess. The location for these virtual realistic spaces could be anywhere that already exists or somewhere that is completely fictional. For the purposes of this thesis though, the location will be in Los Angeles, California. The intent of this video game is to show how architecture can influence and be the complete framework for a video game by using it to create levels within a building which also represent the advancing levels. Architecture can influence how people feel within cities and with the use of virtual reality, this can be in complete control of the designer to create spaces that can range from comfortable to uncomfortable and safe to frightening.

After much work and contemplation, the abstract of this thesis has been changed.

This thesis aims to design an experience of wayfinding throughout interior architectural spaces using the platform of virtual reality as applied to a videogame. Finding the intended route through a videogame using simple architectural cues becomes the objective just like finding the way through a casino or a museum exhibition.

Instead of designing a space to fit within a defined building form, this thesis looks at designing from the inside based on user experience. This process involves looking at a space from interior perspective views as an overall, and in turn, can become more formal architectural drawings such as floor plans and elevations rather than traditional design methods which usually are designed in an opposite order. Designing in this way allows for fruition of an architectural experience that can be explored through the virtual reality of a videogame, creating a crossover of wayfinding in architecture, videogames, and virtual reality design.





Architects should be considered key in the design of virtual spaces within video game design to create a more dynamic and realistic experience. Trained designers look at smaller design aspects that create a whole environment that is exactly what is wanted. This becomes even easier in a virtual environment where natural factors can be controlled to become the ideal. Currently, the environment in video games seems to be an afterthought instead of an integrated piece of the design puzzle. To improve this, trained architects and other real world designers must become a part of the virtual design team. In this thesis, a designed high rise structure will become the physical manifestation of level design within a game and prove how virtual environments can plant themselves within architecture, instead of around scenes of it and can become the vessel in which the levels and objectives take place.

Architecture can truly enhance the virtual environmental design of a video game and how this architecture can be truly interactive as well as dynamic and realistic. The technology of the future is coming fast and architects should be ready to dive into designing a virtual world in which people can live and thrive, just as they do in the physical world right now. This focus will be emphasized throughout research and the ability to incorporate as much of the real world into this virtual created world as possible. Video game design is a huge leap into the realm of virtual reality (this is quickly becoming the future of design). Architecture should adapt as quickly as it can to keep up with growing technology to create adaptive buildings that will last longer without being outdated as well as creating buildings that will virtually last forever. Integrating this growing technology into a thesis will help to encourage the career field that it will forever be growing and incorporating technology to create a more marketable product as well as one that will last in the upcoming future.

The users and clients that will use this virtual reality technology within the realm of video game design and beyond include people who enjoy allowing themselves to immerse into new worlds and solve problems (video game players). Video game users are an average age of 30, but range significantly around that due to the accessibility of new games becoming available on smart phones for convenient use as well. Futuristically speaking, everyone may one day live in a world of virtual reality where they may never have to leave where they are.

The reason that the typology of this project is a high rise is due to the physical nature of a high rise and the way that floor levels can be read and the lines that can be drawn between building levels and game levels. Just as a high rise is organized, similarly is a video game.

Both start at the bottom level, at this bottom level, it is normally open to everyone and public. In this bottom level of a building, there is a lobby where you decide where the next space or objective is or meet others there before ascending to wherever necessary in the building. In the lobby of a video game, players can group together into teams or go alone to the next objective, but must also go through the lobby to start the next

level. Also, high rise buildings are normally organized with the most public spaces at the bottom, the semi-private spaces in the middle, and the most private spaces at the top. This is also true of a video game with the easiest levels to achieve being at the bottom with more and more objectives to conquer before going all the way to the top / last level. There are too many parallels to draw between the architecture of a high rise and the level design of a video game and that is why this is the perfect way to use architecture as physical and objective levels.

The emphasis of this thesis is to create a piece of architecture within a virtual reality that can prove the idea that architects should keep moving rapidly with technology and integrate themselves into the role of a virtual architect whether that be in video games or in the future when people are living within the realm of virtual reality. Architects truly have a lot of give in their education of design that can create more interactive and realistic worlds.

Architecture can truly enhance the virtual environmental design of a video game and how this architecture can be truly interactive as well as dynamic and realistic. The technology of the future is coming fast and architects should be ready to dive into designing a virtual world in which people can live and thrive, just as they do in the physical world right now. This focus will be emphasized throughout research and the ability to incorporate as much of the real world into this virtual created world as possible.

The overall research and design plan for this thesis is to first conduct research (using two methods), document process and progress along the way both physically and digitally to ease later book compilation processes, and follow the schedule that has been laid out to stay on track to finishing the process in a timely manner. By doing these things, the intent is to have a paced thesis that reaches all the goals laid out and is successfully defended. The research methodologies that would work best for this design thesis are Descriptive Research and Evaluations and Diagnosis. A combination of the two will give the most specific information that is necessary for this design thesis and will allow for other opinions to infiltrate the schematics of the design before anything concrete is decided.

Being open to other opinions is important because those opinions are the audience for the final product and would be considered the Beta test in the real field of video game design.

Within the descriptive research method, there are 5 steps: observation, secondary description, descriptive social surveys, complex description, and descriptive case studies. The plan for these steps is to first personally observe as much as possible by both observing others and playing video games that have merit in the area that is being studied within them (the buildings and architecture). This allows for a further personal understanding and full observation from an architectural perspective. The next step is to find others (5 to 10 people) with both similar experience as well as other and have them observe the same things within video games (more importantly, they must observe the same games) via observation and subsequent interviews. Not all information can be collected from just those two methods, but rather by asking even more masses as to their experiences and observations via survey as well (25 to 50 people). Again, these will not be direct observations, but rather general personal experiences. Finally, after all the raw data is collected, it must be compiled and used to help build an understanding of the information from all the different sources and people to gain an understanding of their perspectives and the information that has been sought out. Finally, applying all this data to case study observation and narrowing the scope of what is being observed to that of which most are concerned about.

The second research methodology that would work well in this design thesis would be the evaluation and diagnosis method. This method uses 4 steps in being able to identify preferences and other ratings of the users of these video games. The first step of this method is to identify the parameters in which the thing will be measured, the norms, and the rubric in which it will be rated. In this case, the parameters are video games that the participants have experiencing playing and the rubric will be on a scale of 1 to 5 on how certain aspects of the game rate to each individual (25 to 50 individuals total). The second step is design evaluation, this is the step that judges how the value range worked in the first step and gathering that information. The third step is diagnostics. This step analyzes the feasibility or cost of fixing something based on what you found wrong in the first two steps. The last step is assessment and must be done to apply what was learned and engage the public on the information in a meaningful way.

Using these two research methods, the evaluation of architecture within video game design can be further evaluated and critiqued by not only people trained in design, but by the average user as well and the information collected and analyzed can be used to create a more developed and adaptable environment that will do something to please more of the populous using the game. Gaining the perspectives of several disciplines of

people will allow for a more open mind in the design process and allow for different perspectives to all have a satisfactory result for a final product. Documentation of the design process will include inspiration, sketches, drawings, photographs, digital models and process videos. Documentation will take place throughout the entirety of the thesis project to capture all phases of the design process as well as documenting changes and decisions made. These will all be stored digitally for use within the final thesis book as a part of visually explaining the process that brought the project to fruition. Organization will be very important when it comes to keeping these thoughts and pieces of information straight. Due to this challenge, everything will also be organized in a series of three ring binders that will back up any digitally stored information, just in case of disaster and for reference at any time by thesis advisors. For compilation, it will be convenient to have digital copies ready to be compiled into the final research book. The final book, when completed, will be physically published as well as being made accessible through the Institutional Repository at North Dakota State University.

The careful design process that will be followed to timely finish this design thesis in the next semester will be strict. Research methods will be first and time has been appropriated to have them almost completely done by the beginning of the spring semester, leaving the final analysis of the research to be finished by the end of week one. Before the semester, it is also scheduled to talk to a few teachers that Mike Christenson has contacted from the University of Minnesota Twin Cities that are running a virtual and technology based architecture path that may be able to suggest paths and research that may be of interest. The following first weeks of the spring semester will involve schematic design including sketching as well as starting to integrate the design into the computer as soon as possible while integrating the technologies that will be decided in that first week of the semester (after discussion with the contacts given as well as a discussion with Ben Bernard) as to what is possible for a presentation at the end of the semester. Design will continue while integrating research throughout as it becomes relevant and the design is intended to be 99 percent complete before midterm review allowing for only project revisions being changed after midterm reviews. Doing this will allow for the presentation to be as complete as possible and allow for plenty of time to create a fully completed presentation as well as allowing time to fully develop anything that is wished to wrap up or pursue in the short few weeks after midterms until the final turn in. The compilation of research and information into the book will be attempted after most the design is completed. All the information will be collected and digitized during the other processes, but compilation and final reviews of each area seem more cohesive once the other processes are over and it can be reflected upon.





# Preliminary Research Paper

Is Video Game Architecture the Future of Design?

A Design Research Paper

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North Dakota State University

## Author Note

This paper was prepared for Architecture 763, Programming and Thesis Preparation, taught by Professor Bertolini.

### Abstract

In architecture, there are more career paths than to just become a licensed architect and design buildings and make construction documents for the rest of life. The personality and skill set of an architect is very versatile. Another option, if designing is the focus instead of construction, would be the video game design industry. The two career paths are quite intertwined and allow for flow between and possibly partnership in the future. The video game design path is a fast growing design field that seems to be severely lacking in the area of building and urban design. This paper compares the two career paths and lays out how the two can work together to improve each other as well as showing that there is more than one way that the future of design may take. Adapting these two design fields to the change may have to be the only option in the end, if they each want to thrive instead of being phased out.

*Keywords: video game, architect, architecture, virtual reality, urban design*



Is video game architecture the future of design?

A Design Research Paper

### **Why are Video Games Significant?**

The video game design industry is continuously growing exponentially and also expanding globally. The total value of the worldwide video game industry for 2016 is around 74.99 billion US Dollars. This flourishing industry is projected to take off and escalate to 90.07 billion US dollars by the year 2020 (Global video games market value 2020). This particular market shows no signs of slowing or stopping any time soon. According to recent statistics from the Entertainment Software Association (ESA), 155 million Americans admit to regularly playing video games and 50% of total US households own at least one dedicated game console. The breakdown of gender statistics for game players are 56% male and 44% female with the average game player being around 35 years old. The top devices gamers use in order of most to least popular are PCs at 62%, dedicated game consoles at 56%, smartphones at 35%, wireless devices at 31%, and dedicated handheld systems at 21%. These statistics are staggering in significance, this industry is used by a mind-blowing half of the American population on a regular basis. On a global scale, “more than 1.2 billion people are playing games worldwide” (More than 1.2 billion...). With these numbers being staggeringly high, and the industry growing so quickly, it is important to take a proper look at it and see how it can be improved as well as look at the direction that the industry is headed. There are ways in which the professional architect can immensely improve the video game design industry, launching into the future with more potential than ever. There are many that will ask, why an architect has to be involved in the design process, all buildings are architecture. Right?

### **Are All Buildings in Video Games Architecture?**

Similar to physical structures, not all buildings are Architecture. Prefabricated, generic “cookie cutter” buildings, just as replicated flat facades in the background of a videogame are not truly considered architecture, but rather just a means to an end or an afterthought. There are specific reasons that not just any person can go design beautiful and functional buildings the same way a trained, qualified architect can and why professionals have to be educated and licensed in order to be fully respected and trusted in their field. It is not just about liability, it is about having the education and the skillsets to do more than place a building on a plot of land. Architecture has meaning and purpose. According to Jon Brouchoud (2013), a writer from Arch Virtual:

“Unfortunately, both the real and virtual worlds alike are chock full of buildings, but there is a tremendous deficit of ‘Architecture’. Real estate developers want buildings that will make money, game developers want buildings that look sexy, yet architecture can be so much more...one might think in a virtual environment where anything is possible, that the architecture of these ephemeral environments might reach new heights. That it might break free from the bonds of physical and budgetary limitations and become something so much greater. Architecture can finally be free to become wholly narrative, full of meaning, instigate a powerful user experience, and convey a deep connection to the game plot and player perception. Occasionally it gets there, but rarely. In fact, it’s usually worse. This pervasive phenomenon of architecture that permeates nearly every frame of gameplay, deeply impacting player experience, is at best a background support mechanism.”

In a video game or virtual world, the architecture is the missing key element in what creates the scene that the characters reside in and interact with. No longer does it have to be the background creating a place, it is the place. Just as people would not have a city without buildings to both reside in and interact with in some way, virtual worlds would be empty without things like architecture and a designed environment to walk/race/explore through. The virtual surroundings and habitat have to simulate everything and draw parallels to elements in the real

world in order to be relatable. This includes simulating the buildings, streets, plants, weather, and much more both natural and constructed. In properly using all of these descriptive elements:

“Architecture can tell a story, evoke emotion and shape player experience more effectively than any other aspect of your game. You can have the best characters, storyline, and UI graphics, but without an equally considerate approach to architecture, your player experience will always fall short of its fullest potential.” (Brouchoud, 2013)

The rules of architecture can truly enhance gameplay and bring it to the next tier of potential. These rules include play with light, scale, color, space, contrast, materials, textures, rhythm, and hierarchy. These elements are learned and utilized well by those who are disciplined and have learned within a creative or design field. Video game architecture is more relevant now than ever.

Now there are games that simulate whole cities both real and imagined. What happens when the designer start to use real building and make a recognizable city?

### **Can Real Buildings be used in Video Games and Why Would they be used?**

There are plenty of games out there that have used cities and specific buildings for inspiration within their simulated environments. Looking at the matter legally with copyright and trademarks, the simple answer is yes, within reason. According to David Stark (2010):

“A game may utilize architecture and buildings taken from a city to create a more immersive world for the player. Previous generation video games often utilized crude representations of architecture or previously captured images to evoke this feel. Modern games, however, with more powerful hardware and larger storage mediums, can effectively recreate large parts of a city or full cities.”

This is important to note. Any city can be used in a videogame, immediately creating a recognizable place to those who have been there, but also creates a mental map for those who

will visit after playing the game and be able to navigate because of it. This applies to cities worldwide, but the exception is that “it allows the use of publicly viewable buildings to create a realistic game environment.” (Fox, 2005) This is important information to take note of. Only the publicly viewable exterior may be used because that is public information. When recreating the building, designers cannot follow a floorplan, but must rely on pictures in order to recreate this building. This is a large amount of work when large cities are being recreated digitally. But why would they go through that much work to recreate something real? According to Stark (2010):

“A game developer will need to recreate a large portion of a city and many key buildings in order to evoke the feel of the city. A single copied building would not be enough for the player to recognize the modeled area.”

“This awareness of the consonance of social ecologies in the game and outside it suggests that programmer-deployed typifications of urban space resonated with the way the players read and otherwise indexed spaces within their own real cities...reveal a strong sense of correspondence between simulated cities and their real, solid counterparts” (Atkinson & Willis, 2009).

In these cases, there is an overall feel of the environment that the designer is aiming for, similarly to a movie, it makes the environment more relatable if the users can draw their own personal connections to the place.

It has been explained how architecture influences videogames, both existing and virtually, but inversely how have video games had their influence on architecture?

### **How have Video Games Influenced Architecture?**

Computer simulation experimentation has become increasingly more popular as video games have expanded and taken over the virtual world. These experiments are only taking up

virtual space and can reach a wider potential audience than a physical experiment would be able to. According to Casey Brazeal (2016), a writer and blogger for Planetizen:

“Computer simulations show signs of a coming revolution in scope and power, this new technology has important implications for the future of cities...When city planners harness this technology it will change the way we build cities by giving planners more power to see the consequences of various plans and allow systems to try more possible alternative than would be feasible by any person or team.”

There are specific video games being developed solely for studying urban design and people’s habits within urban areas. This seems to be an efficient and innovative way to collect information while engaging the user in a video game and collecting data about what they do.

According to Jose Sanchez (2016), (Architect and Game Developer of one of these simulations):

“games could help both professionals and the public understand the challenges of contemporary cities...By using games, we can engage a global audience in the problems that architecture is facing...The implications of procedurally generated simulations will have far-reaching consequences for many fields of study, but clearly, tools that help simulate environments will change the way we plan for and predict the effects of our built environment.”

Sanchez then went on to talk about the particular game that he designed as a tool for architects like himself and his colleagues as a means to collect information about a population’s habits within the realm of urban design and public engagement within the spaces and relation with others. He looks at the video game platform as a tool in order to collect data and be able to apply it to real life in order to resolve problems with solutions after simulation. He goes on to explain that:

“Games do not need to be a mechanism only for entertainment. They have the power to immerse players into simulated narratives and allow for a collective thinking through virtual communities...Sanchez believes video games will become powerful tools to understand complex urban design issues, and to encourage collaboration between professionals and communities” (2016).

These are just some of many different applications that can be appropriated by utilizing the platforms and technology that video games have to monitor and draw conclusion about particular human behavior and how it can affect the built environment.

Since architecture and video games cross paths and influence each other as well as having a crossover career option, how is architecture the common link? Is there career crossover for designers in these two fields?

### **How is Architecture Similar in Both Mediums?**

In an article on Archinect, Nicholas Korody interviewed Deanna Van Buren, who is both a licensed architect and designer of the video game, *The Witness*. She specifically discussed how working with that video game design project was very similar to being a design architect. Her response was talking about just that:

“At the end of the day, [architects] know how to think conceptually so I think just being able to think that way – and not all architects are great at that, but many are – and I think it requires that kind of thinking for sure. If you can think pretty highly, conceptually, then you’re just moving into similar processes that you know” (Eden, 2016).

Architects are naturally great problem solvers and have a unique skill set that are not just applicable to a career in architecture, but this aptitude also easily applies to a wide range of career path options. If designing is an interest, then video game design is quite similar to architecture, the biggest difference is creating something virtual instead of drawings for something physical. It is the design portion without having to create the construction documents or dealing with contractors or clients.

Humans instinctively like to explore the world around them in real life, they like to do the same in virtual worlds. It is natural “when we enter new environments, unless we are threatened

in some way,...it is usually to want to investigate our surroundings...Our surroundings can also entail an abstract environment such as virtual reality involving 3-D constructs” (Fox, 2005).

Specifically, urban designers seem to have a place within the realm of designing cities within these virtual worlds because of the understanding that they have with how a real city works and aesthetically looks.

“Now it appears that the scale, realism and freedom associated with contemporary video game environments bear much closer approximation to real cities in their physical completeness, social complexity and possibilities for exploration and experimentation” (Atkinson & Willis, 2009).

This gives urban planners a little more freedom because they will not get overridden by a civil engineer that thinks the streets should be wider to accommodate more vehicular traffic or other logistics similar to that. The urban planner is free to design to an aesthetically pleasing city with fewer lanes of unsightly traffic, as much virtual space as they would like, and spreading or compressing the city as much as they see fit for the game.

With all of these forward thinking technologies and ideas, it poses the question on where architecture and video game design will end up in the future. Obviously, in order to stay successful, both will have to grow and expand, but does that mean that there will still be careers? Or will the technology take over?

### **What does this mean for the Future of both Architecture and Video Game Design?**

Along with continuously increasing technology within both fields there are a variety of future paths that both architecture and video game design could take. This could be from architecture being completely taken over by computers, or a more hands on approach to design with the growing technology of virtual reality. On a more negative approach, Michiel van Lersel

wrote an article called Game Over and he bring up the topic of architects potentially being replaced. He posed several questions:

“Can architects and planners keep up with technological developments or will they be replaced by algorithms and ‘big data’? Or by a 7-year-old with an iPod playing Minecraft? And who will push ‘stop’ when all systems fail?” (van Lersel, 2013).

His outlook on the future is one of technology taking over and going toward a cheaper, more efficient approach. This would eliminate the need for designers almost completely and the profession would be overtaken with the computer. In this case, architecture would not be original, it would be a means to an end, or slightly different versions of the same prototype in order to achieve the efficient and logical outcome. This is more of a math based approach. The next outlook is more of a technology combined with art approach.

On a more positive potential path that most designers and architects are hoping for is the opposite, and that they will grow with technology and continue to utilize it to create overall more comprehensive designs. According to a more positive article from Arch Daily by Casey Mahon (2016):

“It’s time for the profession to prepare. New software and hardware platforms are emerging that allow immersive environment representation – aka virtual reality, or VR – along with gestural modeling, or the translation of hand movements captured via computer vision into design information. Taken together, these two tools allow designers to visualize and virtually inhabit three-dimensional spatial conditions at “full-scale”, where we can do design work with intuitive hand and body motions. The implications for architectural practice are dramatic.”

In the end, there are more than just these potential pathways for the professions to follow, but these are a few of the extreme examples. Architecture and the video game industries are both demand based volatile careers that will be effected by all of these upcoming technology changes and will have to learn to use them to an advantage, or get out of the way and let them take over and be phased out. Either way, something has to change.



## References

Atkinson, R., & Willis, P. (2009, December 10). Transparent cities: Re-shaping the urban experience through interactive video game simulation. Retrieved September 23, 2016, from <http://www.tandfonline.com/doi/abs/10.1080/13604810903298458>

This article discusses the freedom of design between the real city and the virtual city. It talks about potential that has yet to be embraced and the profound adventure that can be found if this freedom is taken to design. It also talks about giving players and users the freedom to do as they wish within the game and that there are no true consequences for their actions as well as no social order. These freedoms also allow the player to differentiate the difference between real and virtual and allows them to become more aware of the physical city around them. The article then interviewed several players and asked them about their awareness both inside and outside of the game. The point of the article was to show the transparency that urbanism now holds to so that it is allowed to be experienced.

Brazeal, C. (2016, August 8). Simulating the City. Retrieved September 28, 2016, from <http://www.planetizen.com/node/87864/simulating-city>

This blog post discusses the potential for the virtual city to use its power to impact real cities as well as city planning. This is done by already used computer simulations that capture data and relay it to analysts in a way that can be used to improve urban design. These systems allow for alternatives to the trial and error method that was done before

and makes for a more interesting and complex city design that is more fitting to its community and demographic of people.

Brouchoud, J. (2013, February 09). The Importance of Architecture in Video Games and Virtual Worlds - Arch Virtual. Retrieved October 04, 2016, from <http://archvirtual.com/2013/02/09/the-importance-of-architecture-in-video-games-and-virtual-worlds/>

The writer of this article argues that video games (although already pretty immersive) are not nearly as architecturally designed as they potentially could be, but rather are engineered to look real. They are still missing many architectural concepts that only trained architects can successfully create in order to experience a virtual reality that is deeply immersive and emotionally evoking. Video games also reach wider audiences than a physical city ever will, and are more ecologically friendly to visit. The whole point of the article was the video games have so much more potential than what they are right now and architects seem to be the key to creating that next level of experience.

Eden, E. (2016, August 25). When Architects Design Video Games. Retrieved October 01, 2016, from <http://www.planetizen.com/node/88200/when-architects-design-video-games>

This interview was done in an effort to get the opinion of a licensed architect that was drafted into the video game design industry and her experiences within the industry and the project, specifically, that she worked on. She worked particularly on a historic game

and was educating artists as to how things were supposed to look, work, and be put together along with coming up with ideas for areas of the project as well (based on the lead's vision of the game). She talked fondly of her experience and now crosses back and forth fluidly from one industry to the other.

Fox, R. (2005). Psychology of virtual architecture. *OCLC Systems and Services*, 21(2), 100-104.

Retrieved from

<https://ezproxy.lib.ndsu.nodak.edu/login?url=http://search.proquest.com.ezproxy.lib.ndsu.nodak.edu/docview/209777148?accountid=6766>

In this article, the author talked about the items that were important to digitizing a current library. The focus was on user experience of navigating the webpage that was designed for these online databases. Navigation should be intuitive to the user and it should be easy to go back to the homepage if the user were to get lost. In a successful webpage or digital media at all, the only way people will actually use the interface is if these qualities are user friendly.

Global video games market value 2020 | Statistic. Retrieved October 09, 2016, from

<https://www.statista.com/statistics/246888/value-of-the-global-video-gamemarket/>

This small article was about recent statistics within the video game industry and the projected growth of the market value from the past couple of years up until 2020. It

mentioned that the value of the industry is projected to steadily rise from now and into the projected future.

Mahon, C. (2016, March 12). 4 Ways Virtual and Augmented Reality Will Revolutionize the Way We Practice Architecture. Retrieved October 01, 2016, from <http://www.archdaily.com/783677/4-ways-virtual-and-augmented-reality-will-revolutionize-the-way-we-practice-architecture>

This was an Arch Daily article that looked at how virtual reality will be changing the way that architecture is designed. Specifically, the article walked about the different types of tools that will revolutionize this process and allow architects to keep up with the rest of the world and their close counterparts in order to continue to improve design and impress clients

More than 1.2 billion people are playing games. Retrieved October 09, 2016, from <http://venturebeat.com/2013/11/25/more-than-1-2-billion-people-are-playing-games/>

This small article was about the most recent statistics about the world population and how many people worldwide are playing video games.

Sanchez, J. (2016, March 7). Video Game Tools Solve Global Challenges in Architecture. Retrieved October 01, 2016, from <http://www.dezeen.com/2016/03/07/jose-sanchez-block-hood-video-game-tools-solve-global-challenges-architecture/>

This short article, from dezeen magazine online, was about the different types of tools within video games that the architecture industry is using and should continue to use in order to improve architecture and urban design. Specifically, it talks about a game called Block'hood that was specifically made for the study of urban design habits. It helps understand what the public wants and needs as well as educating the players on sustainable concepts within a city.

Stark, D. K. (2010). Grand Theft Architecture: Architectural Works in Video Games After E.S.S. Entertainment V. Rockstar Games. Berkeley Technology Law Journal, 25(1), 429-464.

In the past, using real architectural works within a virtual recreation was to be thought of as trademark and copyright infringement. After a few court cases where real cities were either fully modeled or modeled after in cartoon form, there was need for a true look at copyright laws. The Rogers test was developed to figure out in a case by case basis whether there were any violation. In the end, video game designers and movie directors generally can recreate whole cities without any issues as long as it is what is in the public eye and not private property.

Taylor R. (2015). The Entertainment Software Association. Retrieved October 09, 2016, from <http://www.theesa.com/wp-content/uploads/2015/04/ESA-Essential-Facts-2015.pdf>

This page was a PDF of all the statistics from 2015 in the United States for video games. The numbers were all collected and analyzed by the Entertainment Software Association and after that they publish the information. The content is graphically displayed and easy to understand as well as comprehend.

Van Lersel, M. (2013, March 19). Game Over for Architects? - Failed Architecture. Retrieved August 28, 2016, from <http://www.failedarchitecture.com/game-over-for-architects/>

This article was about how it is becoming easier and easier to reproduce and design buildings and structures. It also talked about how children younger and younger are learning these software design skills and that it is a possibility for architects to be phased out because of it. This seemed to be an eventuality to van Lersel and it is continually moving in the direction of computer and automated takeover.







# Basic Elements of Architecture

## Elements that can be Seen in Virtual Reality

the line



the curve



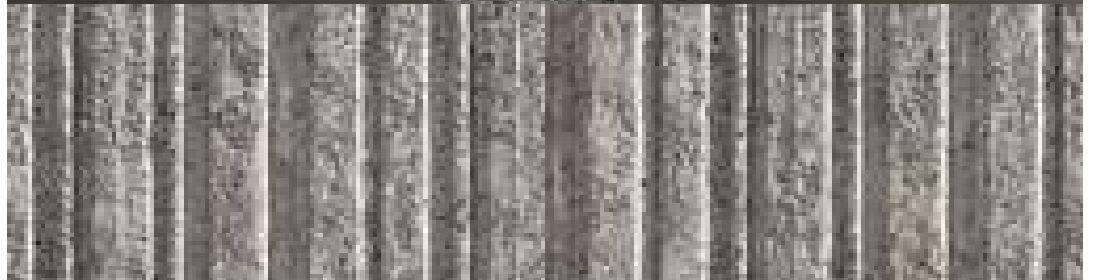
pigment



volume



texture





## Wayfinding Definitions:

### Wayfinding

noun

Signs, maps, and other graphic or audible methods used to convey location and direction and directions to travelers; also written way-finding

dictionary.com

Wayfinding encompasses all of the ways in which people (and animals) orient themselves in physical space and navigate from place to place.

### The Basic Process:

1. **Orientation** (is the attempt to determine one's location in relation to the objects that may be nearby and the desired destination)
2. **Route Decision** (is the selection of a course of direction to the destination)
3. **Route Monitoring** (is checking to make sure that the selected route is heading towards the destination)
4. **Destination Recognition** (is when the destination is recognized)

wikipedia.com

### Modern Usage of the Term (In the Context of Architecture):

to refer to the user experience of orientation and choosing a path within the built environment.

Wayfinding refers to information systems that guide people through a physical environment and enhance their understanding and experience of a space.

segd.org

The act of finding one's way to a particular place; navigation.

-Oxford English Dictionary

## Principles for Effective Wayfinding:

- Create an identity at each location different from all others.
- Use landmarks to provide orientation cues and memorable locations.
- Create well-structured paths.
- Create regions of differing visual characters.
- Don't give the user too many choices in navigation.
- Use survey views (give navigators a vista or map).
- Provide signs at decision points to help wayfinding decisions.
- Use sight lines to show what is ahead.



A large part of the videogame research done was focused on case studies and smaller portion on design/architecture based virtual reality books. The information that was read about pertained to the way that the mind works when a person is immersed in virtual reality and what it can do as a benefit to the individual (being as it is an individual experience).

“Just as we enjoy rich literature that stimulates our rational intelligence, or a moving story that engages our emotional intelligence, so also we seek out and enjoy visual media that challenges our visual Intelligence.”

-Virtual Intelligence

Virtual reality is becoming increasingly more important and can do everything from helping design, to exploring new place real and virtual. Human beings understand that it is not real, but can become just as invested in the space as if it were real (the same can be said about most videogames as well).

The Design Process In Virtual Reality:

The design process of creating these interior spaces in virtual reality is much different than the usual architectural design process. This process involves looking at a space from interior perspective views as an overall, and in turn, can become more formal architectural drawings such as floor plans and elevations rather than traditional design methods which usually are designed in an opposite order. Designing in this way allows for fruition of an architectural experience that can be explored through the virtual reality of a videogame, creating a crossover of wayfinding in architecture, videogames, and virtual reality design.

“This is a kind of expanded electronic paint box which allows you to occupy a virtual structure while you are building it, provided, of course, that you are wearing VR goggles. Technically, adding a 3rd dimension to a paint box may seem to be nothing more than just another feature. Conceptually, it is spellbinding because it creates a completely new epistemological condition. It is just as if you were able to physically occupy your own imagination outside your head.”

This truly explains how the entire process of designing this virtual space felt like. It was one big empty space that was instantly transformed as if it was happening in reality.



The precedent analysis included four case studies of video games that have significantly well done pieces of design within in them whether an architect was on the team or not. These games included The Witness, Bioshock, The Stanley Parable, and Assassin's Creed and all three were great starting points in the realm of designed environments whether it be existing, historical, futuristic, or just designed. By looking at these design works, the bar can be set to show what is possible and what can be improved on when it comes to developed architecture within video games.

The second set of case studies are types of architecture that use architectural elements to guide people through spaces and whole buildings. These include casinos, museums, and airports. By looking at these pieces of architecture, one can study how architectural navigation techniques can be used in real buildings to guide people through to where the architect wants them to go.







The Witness



Bioshock

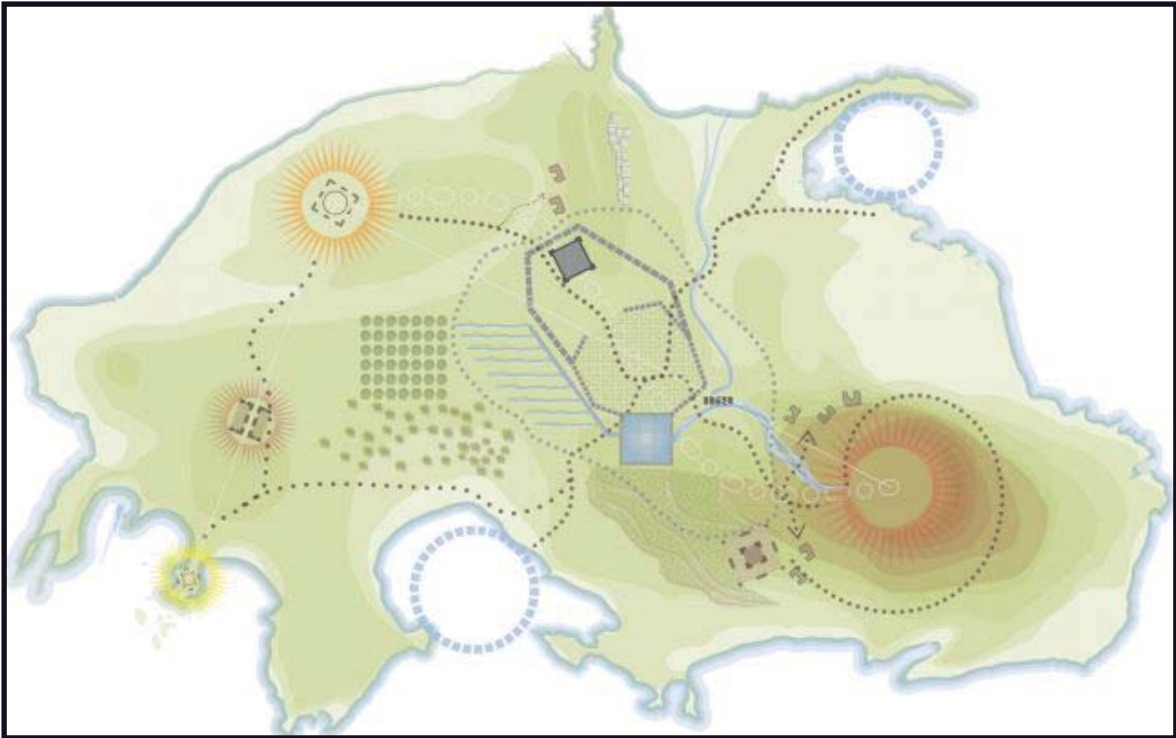


The Stanley Parable



Assasin's Creed

# The Witness



Organization: Organic

Subject: Rural/Island, Architecture & Landscapes

Key Items: Defined Edges, Determined Pathways, Nodes,  
Framing Landscapes

The first case study in this analysis is a video game called The Witness. This particular game was co-designed by a licensed architect, Landscape Architect, and a video game developer. There is a good balance with the design of the game in the sense that it is smooth, quality, thought out, game play within an intentionally designed island space. With a combination of these specialties, it makes for a compelling video game design and a captivating experience in a virtual reality.

According to Deanna, the Architect of the project:

"The reality is that these beliefs may be interfering with a collaboration that could both expand the design and development of physical architecture and video games as an art form."

The landscape of the entire island is that of intentional designed beauty. There was a landscape architect on the team of designers, and it seems to show that every corner was meticulously detailed out. In the image to the right, even the faces of rock are thought out and textured. The water in the environment acts in a realistic way with reflections and a ripple texture and makes for a relate-able experience.



The idea that the entire designed area is this small island is an interesting concept. It creates a contained area in which the characters have a visual boundary without creating an invisible wall that is considered more of an afterthought than a design intention. This boundary keeps all the characters and the story contained as well as making for a beautiful landscape element within the overall design.



This cliff face (shown to the right) with the rugged, but intentional path up the hill lined by rock faces and trees, keeps the character on the path in the way in which it is intended by the creators. Things like this are not normally thought about by architects as often as they should be, but can be a clever way to force an experience that is intended. This is an element that can be learned from video game designers.



The smallest details were taken into consideration, even down to the design on this gate in the formation of a tree attaching into the rugged, deteriorating wall. The beautiful fall colored trees, framing the elements around it, create vistas within the game. Creating frames around these detailed components make for another “forced” direction to move or be led to.







To the left is an example of the architecture in this game. The detail is such that even the metal rebar from the structure of the concrete is showing through as well as the crumbling structure. The detail is uncanny when it comes to video games because not only does it have to look good, but has to look good while moving around to the character's point of view. This is a difficult task that often becomes a nuisance in the field.



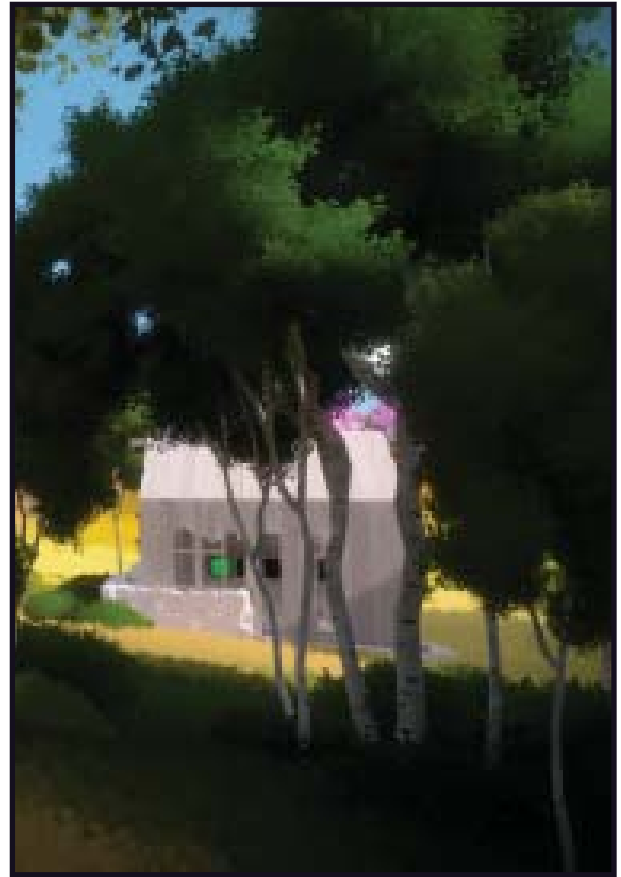
Here is another example of the detail in the landscape with a buildings burrowed into the environment. The texture of the beach sand and waves are incredibly realistic. The play of shadow within the environment also creates an authentic experience of the user. There are so many nooks and crannies within the small environment that the characters can explore, which makes for a fun and individual experience for the user.



The choice of plant material is vast on the island. From trees to shrubs and flowers, they make for natural and comfortable spaces within a larger place. Creating these smaller spaces within larger spaces is a great idea for the environment of a video game for a variety of reasons, depending on the typology of the game.

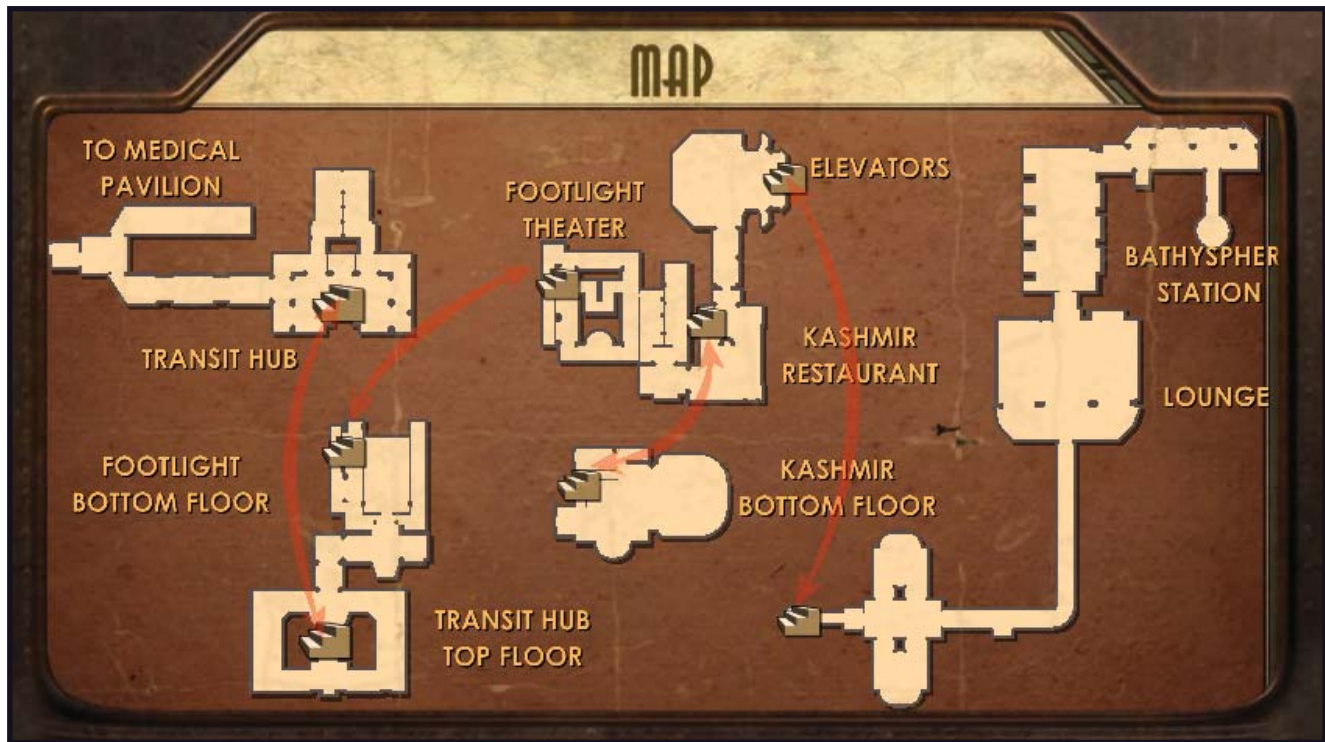


The details inside of the building are just as detailed as everything else. On the picture to the left, there are computers with wires, but while looking closer, the door is just as detailed as well as the composition of the walls and the seams of the stone within them. It is incredible that a moving picture can be this detailed and still be interactive.



### Conclusions:

This design was particularly successful due to the particular team that was involved in its fruition. A moving, interactive video game is much more difficult to allow for the detailed quality of a rendered picture that an architect normally produces. This is an added challenge that must be embraced in order to create a successful game and all the designers on this team seemed to have stepped up and produced a quality, beautiful, and still fully functioning and interactive commodity.



Organization: Structured & Interconnected

Subject: Futuristic Architecture, Underwater Urban City

Key Items: Structured, Definite Interior Paths, Walls as Edges,  
Forced Movement with a Story

In this case study analysis, taking a look at a futuristic design can show how interior spaces and buildings can be the only interactive place in a game (especially in the case of this underwater city).

According to blogger Daniel Carrapa:

"This Utopian metropolis comprises submersed Art Deco-styled buildings, connected by a network of glass tunnels and a Bathysphere system. The city is completely self-sustaining, with its electricity and air purification systems powered by the volcanic vents originated from the bottom of the sea."

This is a completely different atmosphere from the last case that was studied and shows the diversity of environments that can be emulated in virtual environments.



The lighting in this particular game is an element that was analyzed due to the way that water. Light interacts and diffuses through the water in a much different way than it does on land. The designers in this game put thought into this and responded appropriately. Realistically, there would have to be light fixtures in every room and the use of glass to allow for as much natural light as possible to be let in was a great addition to this thought.



The city of Rapture looks rather like any other city at nightfall, some of the designs look as if they were quick afterthoughts. The designers made a cityscape with no thought about the environment in which it is present. This could be anywhere on land in 2016. This is clear after the game was tested and many of the players did not realize that it was supposed to be underwater. The use of an architect on this project definitely would have been useful in defining this important detail.



Overall, the interiors of buildings look to have rounded and futuristic as well as being able to hold up under the pressure of water. There seems to be a very small amount of steel structure holding up the glass and surrounding elements. The overall building is simple, but does not look as sound as it should for being at the bottom of the ocean.



Understandably, the neon signs of the buildings can be seen from the windows and glass areas looking out into the city. These add to the aesthetic of a city anywhere. On the other hand, these signs do add to the atmosphere that the designers seemed to have envisioned of a futuristic city that feels almost historic, like buildings and items needed to be reused in order to survive in this new environment. In this way, they are used in a way to reiterate this premise of the overall underlying story of the game.





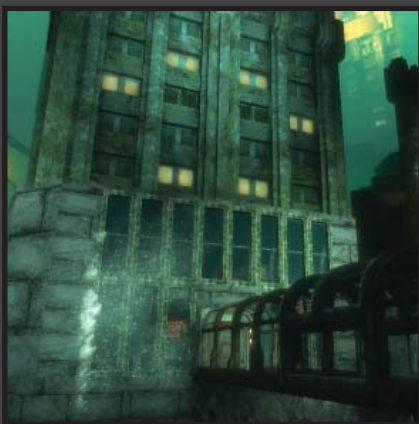
The idea that there are some signs on the outside of certain buildings is completely understandable, but what is not is the framed entryways. Visitors of Rapture enter buildings through tunnels, not through lighted, signed area on the building. This would make much more sense to have on the inside of the “skyway” areas, when the characters are entering each building. This was completely overlooked by the designers. They were going for an overall aesthetic instead of looking at it in the eyes of the character walking through the place.



The scale of the buildings seem to be off in this image to the left. The whale is either very small, or the building behind it (The Empire State Building?) looks excessively large. The other thing to keep in mind is the material palette that is used. There seems to be a fair amount of concrete and metal, both of which would not fair well for an extended period of time in keeping water out and holding up against the salt.



Looking at the interiors, there are some quite stunning views down corridors, making it all seem to be grand and important places. In an environment like this, where the interiors are seen and interacted with much more than the exterior, extra attention must be added to define the habitat. This is where a building designer can use their honed skills to define particular spaces and create the main areas in which the character will interact in and with.



The overall patina on the outside of the buildings was done really well. The algae would start to grow on concrete buildings would create this green hue on the buildings and they would start to blend into the background and the surroundings. There would be more tunnels to go from one building to another if the city is as big as it looks, but the glass “skyway” like tunnels helps the user to relate to an already existing element.

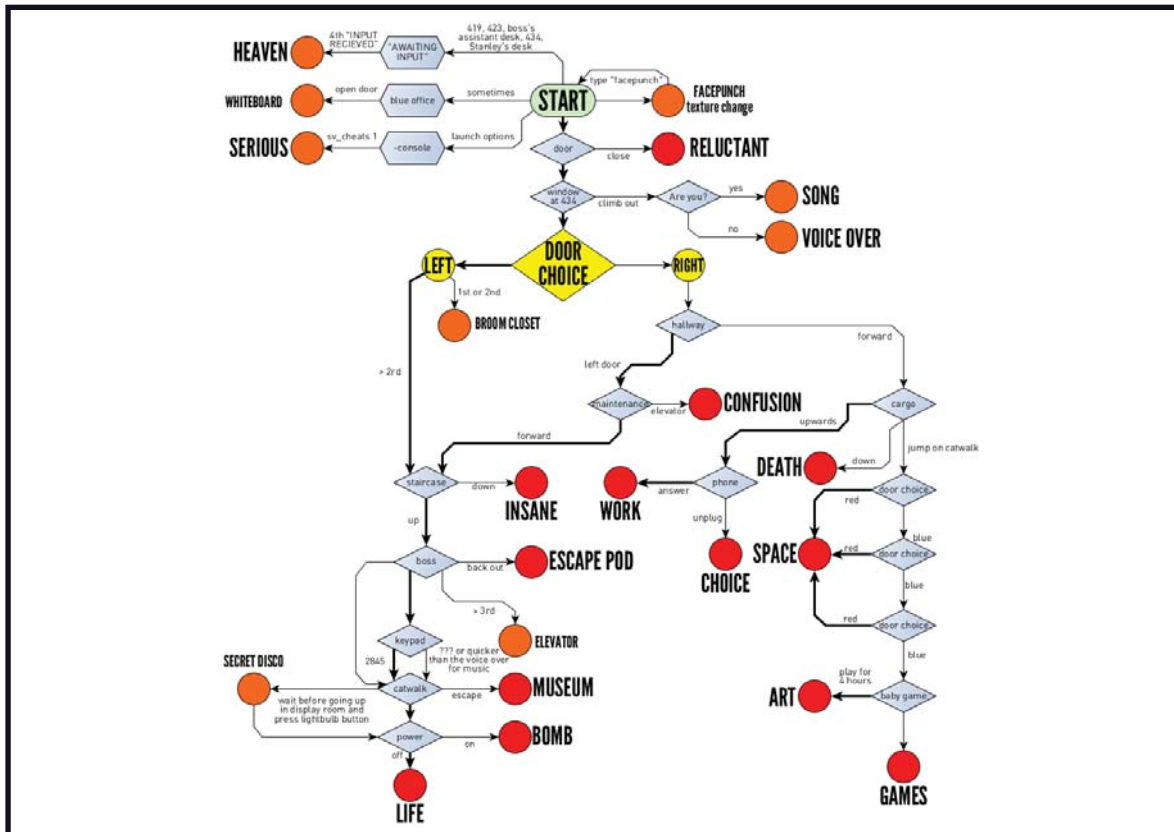




### Conclusions:

Although the idea of a futuristic/historic city under the sea is quite neat, there were some major flaws in the design of this game when it comes to the composition of architecture and the environment. There could have been much more done in order to reiterate and emphasize the underwater city and make for an even more sophisticated looking city. The use of some sort of building or structure designer could have been helpful on the team to make a more meaningful, realistic, and overall cohesive city. This is an example of how easy it is for building design and exterior elements to become an afterthought.

# The Stanley Parable



Organization: Maze-like with decision making

Subject: Office Interior (Interior Only)

Key Items: Split paths with Multiple Branches and Possibilities

In this third case study analysis, taking a look at a usual setting that is relate able and making it into a strategic maze. There are many possibilities within that allow the user to make their own fate in the game (pictured above in a chart).

The Creators Stated:

"The Stanley Parable is a first person exploration game. You will play as Stanley, and you will not play as Stanley. You will follow a story, you will not follow a story. You will have a choice, you will have no choice. The game will end, the game will never end. Contradiction follows contradiction, the rules of how games should work are broken, then broken again. This world was not made for you to understand."

From the lighting and the ambiance of the area, this space would seem to be off limits, but yet the user is allowed to explore the space anyway. This is a great way for the game to allow the user to explore the spaces of the game while still reminding them that it was not intended to be the main story line.



There are also general spaces that would be seen in any office setting allowing the user a sense of familiarity. This being the main character's (Stanley's) cubicle space where he works before things went weird.



There are many places in the game where the user is specifically given a branch of two doorways as a choice. In this case, they are both seemingly the same, even though each could have very different outcomes. This is a huge part of the exploration of the game.



This stairwell is another example of where the user would want the possibility to explore without being forced. It looks scary and may cause the player to be unsure, but if a player does not like that kind of game they are not forced as this being their only option.





Some corridors only allow for one way out unless the user decides to turn around. This is more of a strict strategy to push the user to the next doorway down the hallway space. The space is also small causing the user to not show down, but rather head straight to the beyond.



The lighting is a key aspect in the game, guiding the user to where the narrator kindly guides them to go. In this particular area, the narrator is guiding the user to the office shape through the doorway.



Here is yet another choice between doorways, but in this case the user can see differences between left and right with color. The colors may mean something being as red and blue represent things such as warm and cold.



Here is a office meeting room that seems to also be not a guided space, but there is a lighted way out. Meant to be a familiar space, but not one intended to explore, but rather just be guided though to the other end.

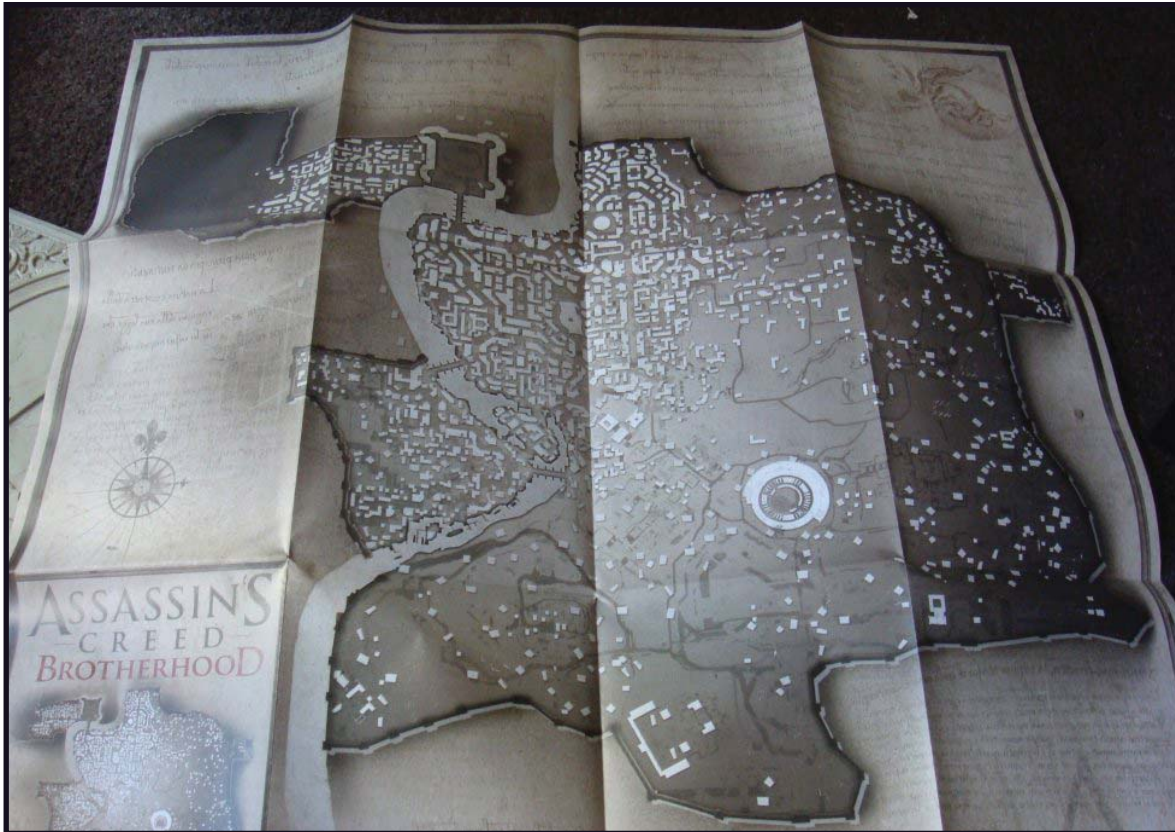


### Conclusions:

This free exploration game allows the user to choose their own fate within the realm of the game using both a narrator and the architecture to guide the user through the game, making it seem like they have infinite choices, while also only providing a small amount of real given choices. The choices that are given all have consequences and the user can try over and over again with a multitude of endings. This maze like exploration game allows the user to fully interact with the architecture and what is was intended to do.



# Assassin's Creed



Organization: Organic Existing City Development

Subject: Historic Architecture, Mixture of Several Cities

Key Items: Existing Buildings & Cities, Historic Time Period,  
Italian/Roman Architecture

In the fourth case study, the focus is on a replica a mixture of several historic cities. In the case of Assassin's Creed Brotherhood, replicating Rome and other major areas of Italy in an earlier time period.

According to Daniel Carrapa, specifically:

"Assassin's Creed II takes place within several regions throughout late 15th-century Italy such as Venice, Florence, Forli, and the medieval walled town of Monteriggioni. The follow-up, Assassin's Creed: Brotherhood, expands this excursion into the architectural beauties of Renaissance Italy, presenting a faithful, highly detailed reproduction of Rome in the early 16th century."

The realistic nature of the buildings within the game are exquisite. The detail is incredible and there was an obvious amount of research put into the game to make it as realistic to the time period as possible. Not all of the buildings are real and existing, but many of the larger ones are, creating recognizable parts of real cities within a virtual space that can be explored from the comfort of home.



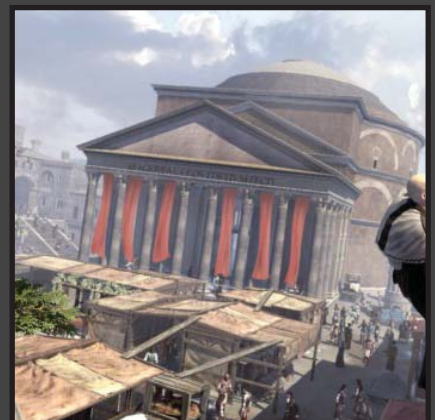
In many of the cities in Italy, there are many hidden open hidden plazas (such as shown in the image to the right) where people go to gather, normally with the entrance of a church somewhere nearby. This is portrayed almost perfectly in the piazzas of Assassin's Creed. This is one of many small elements that were studied and brought into the environment, whether intentionally or not, making it much more realistic than imagined.



From views within the city, it looks to be endless, stretching out as far as the eye can see. Video games are required to have edges, but this one does a great job of making it look limitless, while it is not. The designers also did a great job of keeping the feeling of charm and visual aesthetic that Italy has, even in the smallest buildings and details like the roof tiles, masonry color, and texture.



The Pantheon in Rome is one of those pieces of unmistakable architectural icons. This is just one of the many areas in the virtual city that starts to make it relate-able and recognizable. It is because of games like this, that when users of the game visit the city in which it is based, they can navigate quite easily as if they have already been there before. This is the true definition of "virtual reality" and will continue to develop and become more reliable as technology and game design improve.







The Roman Catacombs were also recreated in the virtual world. These catacombs are located on the outside of the city walls of Rome, Italy and were used by the roman people for their dead from the 2nd century to the 5th century and were rediscovered in the 15th and 16th centuries. In the time period of the game, the catacombs would have been being cleared and studied, such as seen in the image to the left.



The protective walls throughout Italy in many cities are a historic and important part of their past. Although they were not used by the 16th century anymore, they were still present in the city. The element of making these walls around their merged city in the game was a great design decision for the subject of the game. The developers used this as an opportunity for the walls to act as the “edge” of the interactive city for a majority of the map in the game. Using the built environment as an edge is the smart thing to do.



The Colosseum also makes an appearance in the game, as it is a large iconic part of the Roman landscape. It is recognizable from great distances and can be used as a way finding landmark within the game for navigation. Using landmarks and other large buildings for navigation is just as natural in a game as in real life. This simulation in virtual reality adds to the idea that these skills are elements that are used in games can be applied to real life as well.



This is the area around St. Peter's Basilica. In the 16th century, the new basilica that is known today was being constructed over the old church (hence the scaffolding). The tiny detail of this construction scaffolding and the dome being built makes the thought into this virtual reality even more authentic. Overall, the designers did a very good job of being able to replicate large pieces of Italian cities and merge them, while keeping the architectural detail and style in tact.





### Conclusions:

Because many of the buildings that are used in this particular environment are existing or used to exist, they were technically designed by architects (some of them quite famous ones). The existing cities were organically developed quite successfully, and using this, the game developers knew that by using them, the navigation and success of the environment were already cued in. This was genius in the sense that it not only utilized the work of others, but also created a city that could be explored recognizably, just like the real city that it is based on.





Casinos

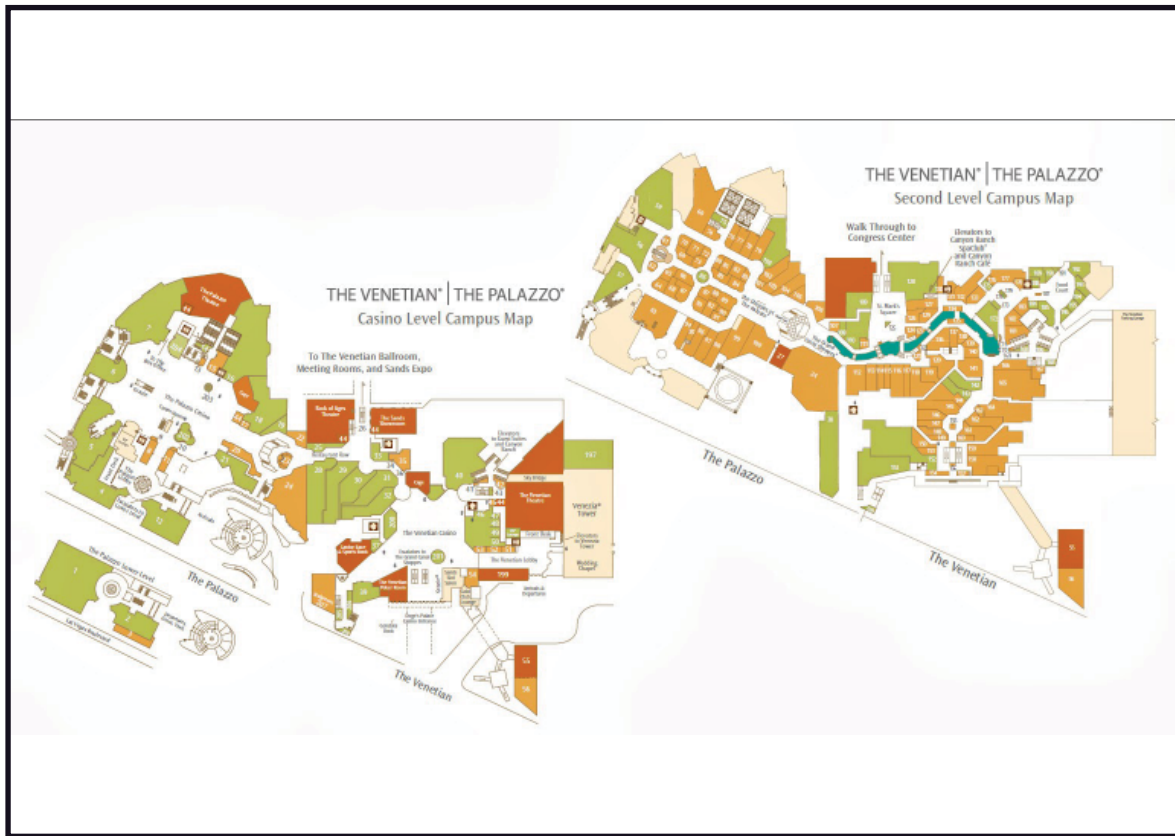


Museums



Airports

# The Venetian & Palazzo



Organization: Organic Organization

Subject: Casino - Meant to guide people to the restaurants and gambling (to spend money)

Key Items: Meandering Central Corridors, no one straight path to anywhere

In this first casino case study, the layout of the casino is studied to analyze how the casino “forces” its guests to walk through certain areas or less easily navigate other spaces in order to distract them and spend more money within (the assumed prerogative of the casino). Casinos are about feeling rich and gambling your money.



Central circular areas that seem to both distract and guide the user to where the casino wants them to go. The extravagant materials are both distracting and inviting to the guests making them feel welcome and invited into a life of luxury.



Split paths are also within the casino to give the guest options to lead them to different areas within. These guide them deeper into the casino, but still subtly letting them know where they are with signage leading them to different areas.



This signage only tells the guests where things are within the casino, keeping them contained to where the casino wants them to go within its facility. These signs are up high as to not get in the way or distract from the illuminated games that they are passing by.



Long central corridors lead the guests from the bar to the casino area, also creating a rich atmosphere with a feeling of luxury and space.





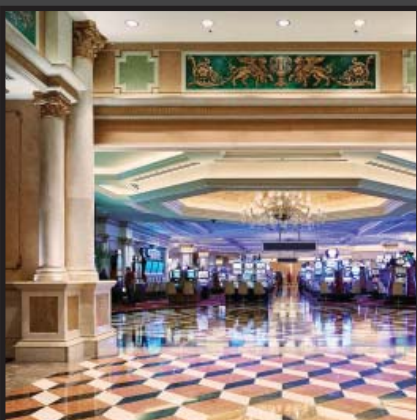
Overhead architecture also leads the guests to certain spaces over others (both with ceiling height and lighting). This particular space is only made up by what the ceiling defines because there are no walls creating the boundaries of the space.



Large casino elements can also define spaces within a casino. This large and brightly lit machine holds the corner of the space and is directly off the walking path so explorers can sit down for "just a few minutes" and once they are done can stand back up and get back on the path once again.



In this case, the tables have become the "walls" of the space defining it and creating open areas in between for people to both participate and observe.



Grand Entrances draw in large crowds of people to the seemingly small space within. Then, once inside the guests come to find out that the spaces keep going on as a continuation of smaller spaces chained together.





### Conclusions:

Overall, it is not the walls that define the open spaces, but instead the arrangement of the smaller furniture, machines, and tables. These can also be easily moved frequently in order to not make the spaces be familiar to frequent customers. There is always something new and different at the casino which can become part of the draw.

# Aria Resort & Casino



Organization: Radial Organized Building

Subject: Casino - Meant to guide people to the restaurants and gambling (to spend money)

Key Items: Curved Corridors with many Branching Paths

This casino design is a little different compared to the last one. This casino has more of a contemporary/modern design scheme more new instead of old luxury (drawing a different, younger crowd). Aria Casino also located all of the non-gambling spaces toward the back, making everyone walk through the gambling spaces to get to final destinations.



This particular casino used a semi-radial plan for the layout of the casino. This not only created an interesting shape on the outside, but created casino like, wedge shaped pieces and harder navigation of spaces on the inside.



The lighting of spaces inside other than gambling areas is quite intriguing. Attention is also drawn to the bars (another large source of income for the casino). Tables for gambling are also located in close proximity to these bars for easy access to more alcohol while continuing to gamble.



This atrium space along an outside wall helps to draw guests in and not showing them immediately what they are looking for.



The wedge shaped pieces can really be seen in this image and are also defined with walls and floor patterns in the carpet. The machines are also organized in straight patterns allowing for easy access to any machine without getting stuck between people and furniture.





The curved path can be seen in this image. This path shows where to go, but does not show where the end of the path is. The floor, ceiling, and furniture all highlight this path.



This path can also be seen in this image with more definition of the height of the ceiling and the defined carpet pattern and furniture lining this path.



Small areas of the interior are highlighted by circular areas that are fully and partially closed off for more private spaces inside of the interior.



Semi-walls also break up the spaces while still allowing it to be seen through and able to see beyond. It is used just like a piece of furniture to define the space.

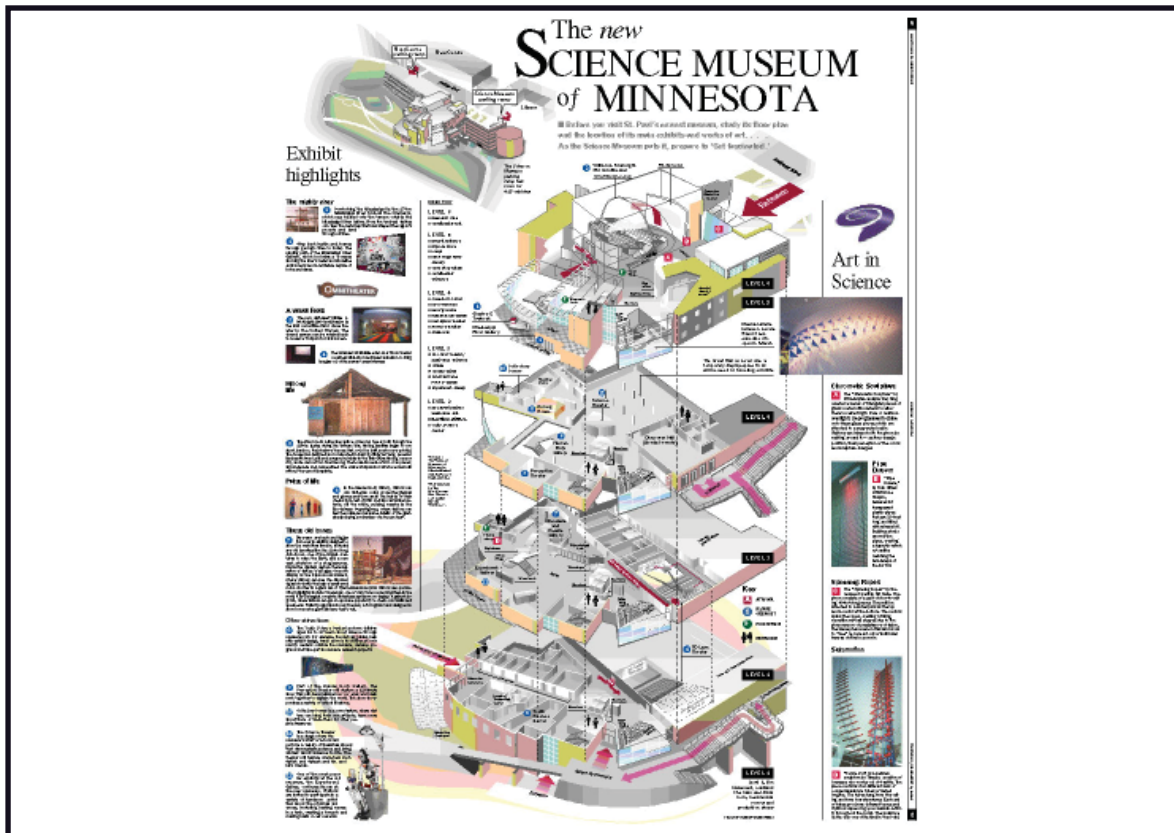


#### Conclusions:

The curved corridors do not allow guests to directly see beyond to where they are heading. People must then use signs to guide themselves through the spaces to where they intend to go, or just wander around and allow themselves to get a little lost.



# The Science Museum of Minnesota



Organization: Interior defines the exterior, exhibits come first

Subject: Museum, meant to be explored by both adults and children

Key Items: Exhibits and spaces leading to and in between exhibits

This museum, located in Minnesota is a place where both adults and children can explore and learn about science specifically. It is four stories and is home of several permanent exhibits, but also brings in traveling exhibitions as well. The spaces are well thought out based on what is inside and the spatial layout feels natural.

The spaces on the inside inform the shape that the outside is. It is very geometric, but organic.



Railings around the exhibits define spaces around where people can be and where people are not supposed to be, this also helps guide people through the spaces as they walk around from exhibit to exhibit.



Eye catching, eye level exhibits and pieces draw children and adults both to and through spaces.



Interactive spaces draw in children especially and in a museum it allows children to learn through the sense of not only seeing, but through touch.





Large objects with things to see inside also draw people to and by. This large tornado alley vehicle allows people to see what is inside and just something cool to look at and learn about.



Interactive exhibits that both adults and children can play with are great, but this wave wall also is used to draw people into the natural disasters exhibit as well as acting as a wall from the large atrium space of the main floor of the museum.



Varying subjects also helps to draw people through to another exhibit because they can see what is coming up next. This one in particular draws people from the dinosaur fossils to the space exploration exhibit.



Not only does the museum have permanent exhibits, but it also has traveling non-permanent exhibits that need to be planned out before they arrive to the museum so the space can be prepared ahead of time. This image shows how they plan out these spaces.

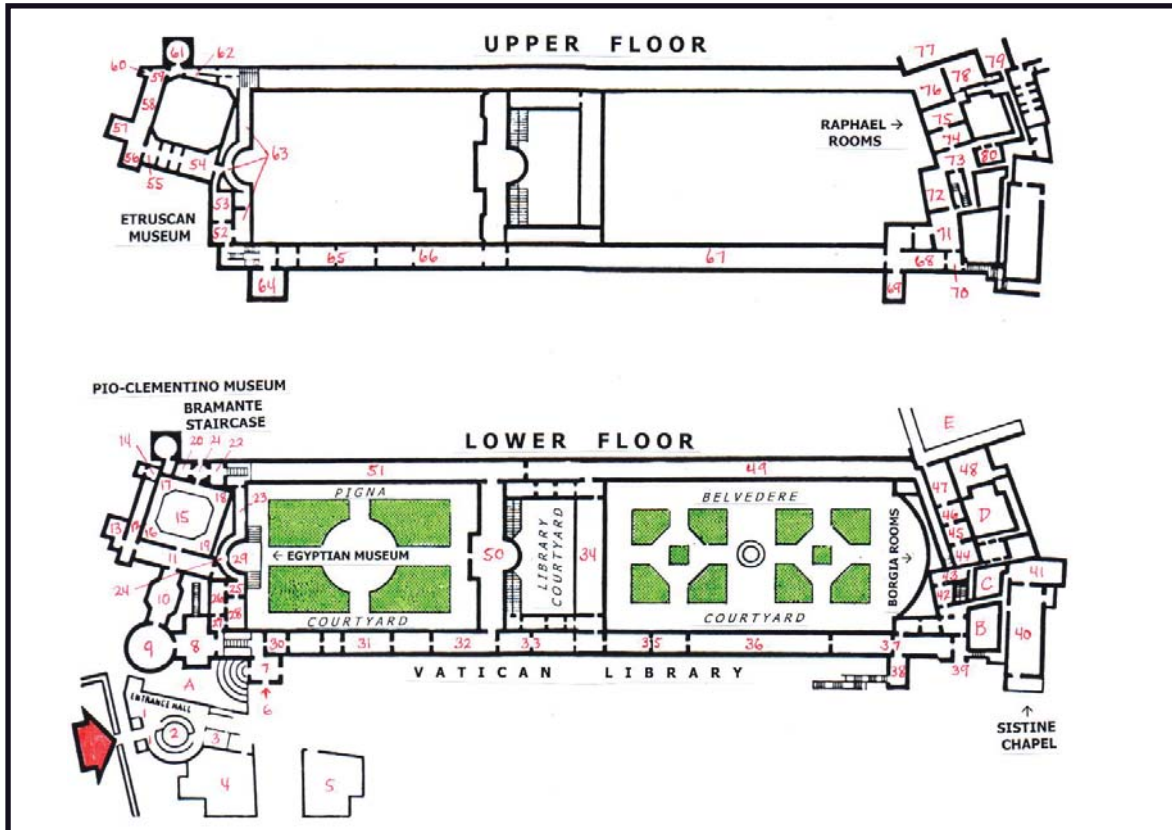




### Conclusions:

Both with permanent and non-permanent exhibits in a museum, the spaces must be designed in a way to draw people from one space to another in order to have people move smoothly throughout for the whole day. This both spreads people out and allows them to see everything the museum has to offer.

# The Vatican Museum



Organization: Long, straight and square spaces.

Subject: Museum, meant to for more of an adult crowd rather than children

Key Items: Exhibits and spaces leading to and in between exhibits

This museum is largely art and history exhibits, all of which are permanent and are a part of the Vatican's large collection. This museum can be explored by all ages, but it particularly aimed towards adults. This can be seen in shelving and exhibit display height as well as the spoken "look, but do not touch" policy.



The entrance is the most interesting piece of architecture created for the museum. It is this beautiful archway located on the face of an otherwise dull and flat wall. This is the only thing announcing the entrance of the museum.



Doorway after doorway after doorway lead people through each space one at a time, each room covered in extravagant artwork on all walls and each ceiling. This pulls people through discovering new art through each new passage.



The long barreled ceilings covered in artwork draw people through the space all while looking up and seeing what is up ahead on the ceilings and the walls.



Where there is not art covering every single wall, there are priceless artifacts in cases throughout rooms leading people from one to the next to see what tiny trinkets are in each one.





Natural lighting is also brought in to the spaces to allow for both lit corridors as well as to help draw people to those spaces. With the light being in the distance, people will be drawn to see what is in that space coming up next.



Doorways are even covered in art in some areas of the museum. Every inch of the spaces make the people want to see what large grand things are just beyond.



Here is another example of how everything is covered in art drawing crowds of people though and never making them feel like they missed something, even if they never went to the other side of the corridor.



Double barrel rooms allow for more art and history to be displayed as well as for more choice of the user to decide where to look first, or to skip certain areas to get to others more quickly.

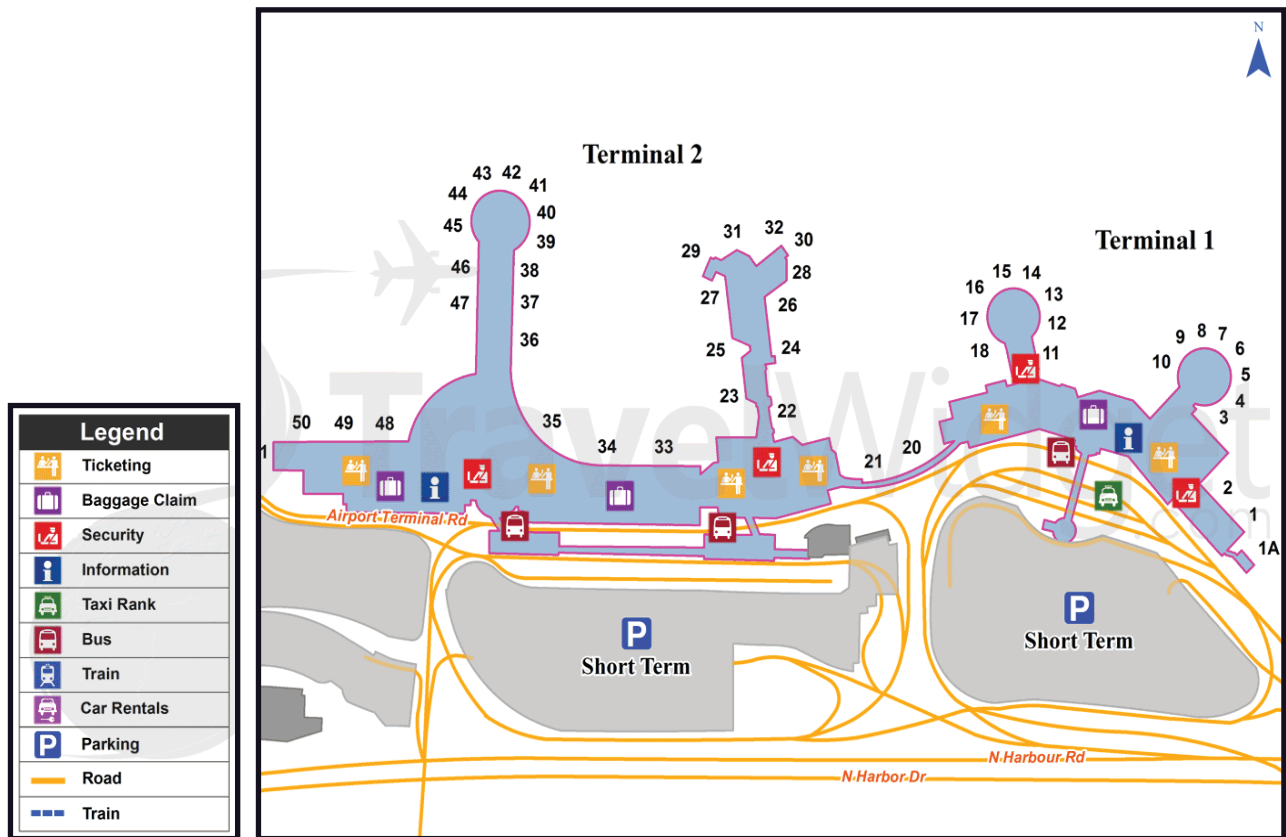




### Conclusions:

At the end of this long historic and winding journey, there is a large spiral staircase that brings everyone back down to ground level where food and exits are located. This adorned spiral staircase is no exception to the extravagance of the entire place.

# San Diego International Airport



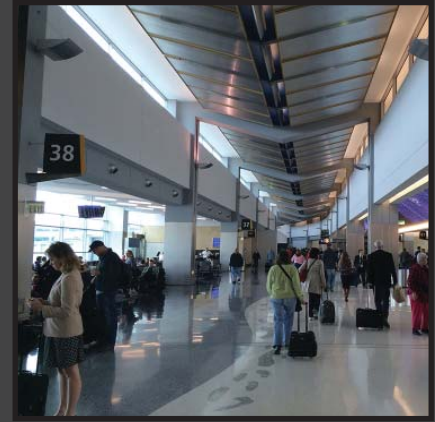
Organization: Long plus radial pattern

Subject: Airport, meant to be easy and quick to navigate

Key Items: Signage, easy to follow architecture, well organized layout

The San Diego International Airport is apparently one of the easiest airports to navigate in the United States. This is due to a variety of factors including its smooth layout and consistent signage.

The fairly narrow corridors keep people on track to where they are supposed to be going as well as natural lighting from overhead to bring this element into the center where less light may be.



There are areas overhead that also have video-boards of people swimming in the direction of pedestrian traffic. This creates both a visually stimulating element as well as a great way to guide people through the space and onto the next one.



Baggage claim is also laid out in a way that is easy to navigate. Every corral is lined up and in order in a way that allows travelers to quickly find where their luggage will soon be as well as enough space in between to allow people to wait on both sides.



The simple gesture of lighting corridors and changing floor color to where people are supposed to be walking both frees up blocking of hallways as well as creating a space for people to be able to quickly and efficiently find their gate.







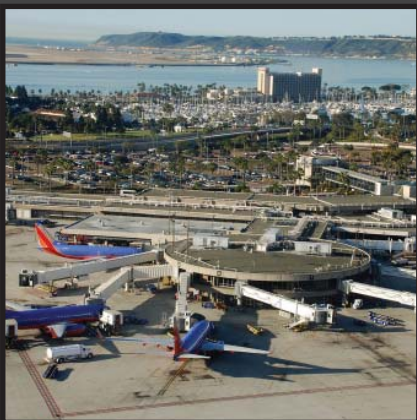
Even the simplicity of lining up all the machines in a way where people can easily see where a line is supposed to form as well as who is available to help really quickens the ability for people to get through and then get to security.



These elements of the walls bending out and the ceiling giving way to a more open space allows travelers to feel less trapped in the building and allowing them to see straight out and what is beyond for ease of navigation.



The broken up facade of the outside is also helpful when navigating where to drop people off and pick people up, allowing for faster movement of people and vehicles through the immediate exterior space.



The radial arrangement of the airplanes around single circular gates allows for ease of navigation for all the travelers in the gate. Once there, it is easy to see where one is supposed to go and wait until ready for boarding.

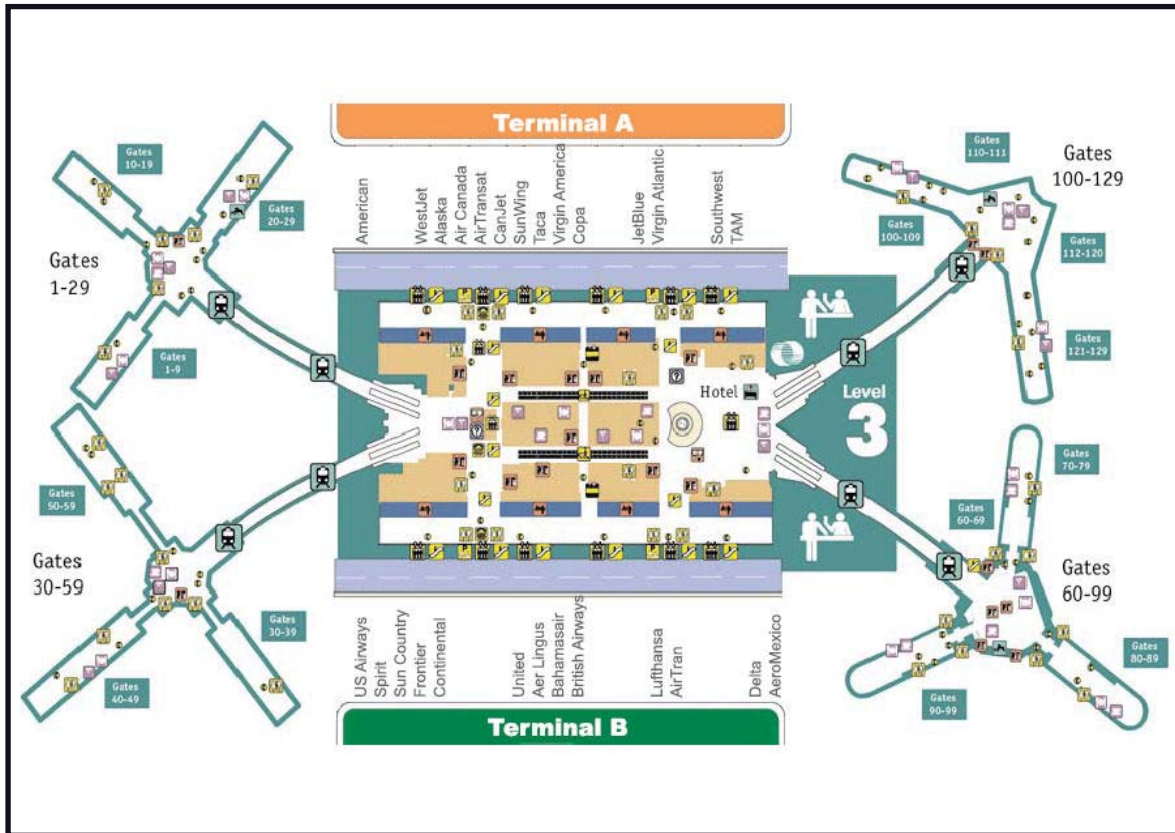




#### Conclusions:

Overall, it seems agreeable to say that the San Diego International Airport is a great example of what should be done to create an easily navigable airport space that is both functional and well designed.

# Orlando International Airport



Organization: Branched, spread out organization

Subject: Airport, meant to be easy and quick to navigate

Key Items: Signage, easy to follow architecture, well organized layout

Orlando's airport is another good example of an easy navigable airport. This airport layout is more of a branched style that allows people to go one of four ways to get to the place they are supposed to be. This is as easy as choosing to go which way at an intersection.

Clear branching and labeling allow for these spaces to be properly navigated in minimal amounts of time. The numbering is large and very hard to miss.



These branch points also allow for spaces like this image to the right to form. This space allows for natural light to come in and make for a large indoor space for people to sit and wait for flights while eating food or relaxing.



Again, clear overhead signage makes finding where the traveler is supposed to go much easier and less confusing.



This airport also uses the element of lit corridors and change in color of floor to guide people though to where they are looking to go. It is similar to creating a street inside, showing people where to walk.







Large signs with a “light at the end of the tunnel” effect seem to work quite well in this airport in order to guide people to where they are allowed to wait versus where they are to travel though to get to the waiting areas.



Even other spaces, like the image to the left where passengers wait for the train to take them other places make for a nice area to both walk and wait.



There are also spaces where the airport connects to hotels for travelers to spend the night that are great for lounging and waiting.



The image to the left is an overall view showing how all of these spaces align with each other creating one main area, and four branched auxiliary areas.



#### Conclusions:

Overall, the Orlando International Airport is an extremely easy navigable airport with numbered signs and only four possible ways to go both cutting down on being able to get lost as well as only four ways that travelers are allowed to go. Less choices means less possibilities for getting lost.





The program analyzed how the spaces in the building are proposed to be broken down as well as general areas in the building and visually how they relate to each other and how those associate with a video game level design.

This was later changed and instead of specific real spaces, was simplified to truly discover wayfinding using basic architectural elements instead of filling the building with furniture and items.

# Space List

FUNCTION	STAFF	CAPACITY	NO. OF UNITS	AREA/UNIT	NET AREA	NET AREA SUBTOTAL
UG Parking						
Entrance Spaces		100	1	6000	6000	
Subtotal						6000
Lobby						
Front Door Reception	2	25	1	6000	6000	
Subtotal						6000
Entertainment						
Seating		200	3	1920	5760	
Serving			3	1000	3000	
Preparation	30		3	1000	3000	
Theatre	15	150	1	6000	6000	
Bathrooms			4	60	240	
Subtotal	45	350				18000
Shopping						
Circulation			1	1000	1000	
Freight	20		1	6000	6000	
Store Units	50	250	20	832	16640	
Bathrooms			6	60	360	
Subtotal	70	250				24000
Offices						
Exec. Offices	30	30	24	250	6000	
Office Floor	200	200	4	3830	15320	
Bathrooms			8	60	480	
Storage			4	250	1000	
Conference		40	4	250	1000	
Reception	4	4	4	300	1200	
Subtotal	234	274				24000
Apartments						
Units		45	31	Varies (See Next Page)	24000	
Subtotal						24000
Condos						
Units		20	8	Varies (See Next Page)	18000	
Subtotal						18000
Pent House						
Unit		6-8	1	6000	6000	
Subtotal						6000

## Residential Breakdown

Apartments	10 - Studio @ 500 sf =	5000
	10 - 1 BR @ 700 sf =	7000
	8 - 2 BR @ 1000 sf =	8000
	3 - Suites @ 1333 sf =	4000
	SUBTOTAL =	24000
Condos	4 Small Condo @ 1500 sf =	6000
	4 Large Condo @ 3000 sf =	12000
	SUBTOTAL =	18000
Pent House	1 Large Pent House @ 6000 sf	
	SUBTOTAL =	6000

This space list breaks down the different areas within the mixed use high rise and examines how many people will use the spaces as users as well as staff members and the amount of square footage needed for each. This is extremely helpful when deciding how large the overall building should be and how genres of spaces should be broken down into physical spaces within it. The residential is even further broken down into how many of each unit and sizes.

## Building Area Summary

SPACE NAME	STAFF	CAPACITY	NET AREA	NET:GROSS	GROSS BUILDING AREA
Parking					
Entrance			500	0.50	1000
Spaces		100	5500	0.50	11000
Subtotal		100			12000
Lobby					
Front Door					
Reception	25	20	6000	0.50	
Subtotal		20			12000
Public					
Entertainment	45	350	18000	0.55	34000
Shopping	70	250	24000	0.55	50000
Subtotal	115	600	42000		84000
Semi Private					
Offices	234	274	24000	0.55	
Subtotal	234	274			50000
Private					
Apartments		45	24000	0.50	48000
Condos		20	18000	0.50	32000
Pent House		6-8	6000	0.50	12000
Subtotal		71-73			92000

The building area summary is a more general chart analyzing the net and gross building areas. This is important to keep in mind when thinking about how much space is needed as actual space and how much is needed in addition to that for mechanical, plumbing, electrical, and other spaces that are necessary for operation as well as wall thickness. Although this is normally a factor for physical building because someone has to pay for every square foot of the building, in the virtual world it is more of a suggestion as to what spaces appear to be and what they actually must be.

## Land Use Requirements

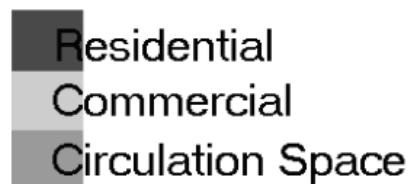
LAND USE AREA	STAFF	PEOPLE	FLOORS/BLDG FOOTPRINT	GAC	LAND AREA
	374	1067	20 floors total @ 6000 sf	60%	6000 sf
	Parking for 100		Underground @ 6000 sf	-	-
		Sidewalks / Seating Etc...		20%	2000 sf
		Landscaped or Grassy Areas		20%	2000 sf
					10000 sf

Finally, in the land use requirements diagram, the information analyzes how much of the site is being utilized by what. The four categories for this particular building include the actual building, parking, hardscape, and other. Each of these categories takes up a part of the site in order to create a whole one. Although it seems ideal as architect to use the entirety of the space, that would not be smart because the area around the building is just as important as the building itself. The environment in which the building resides can reflect it well or poorly creating a space that may be avoided instead of being welcoming.

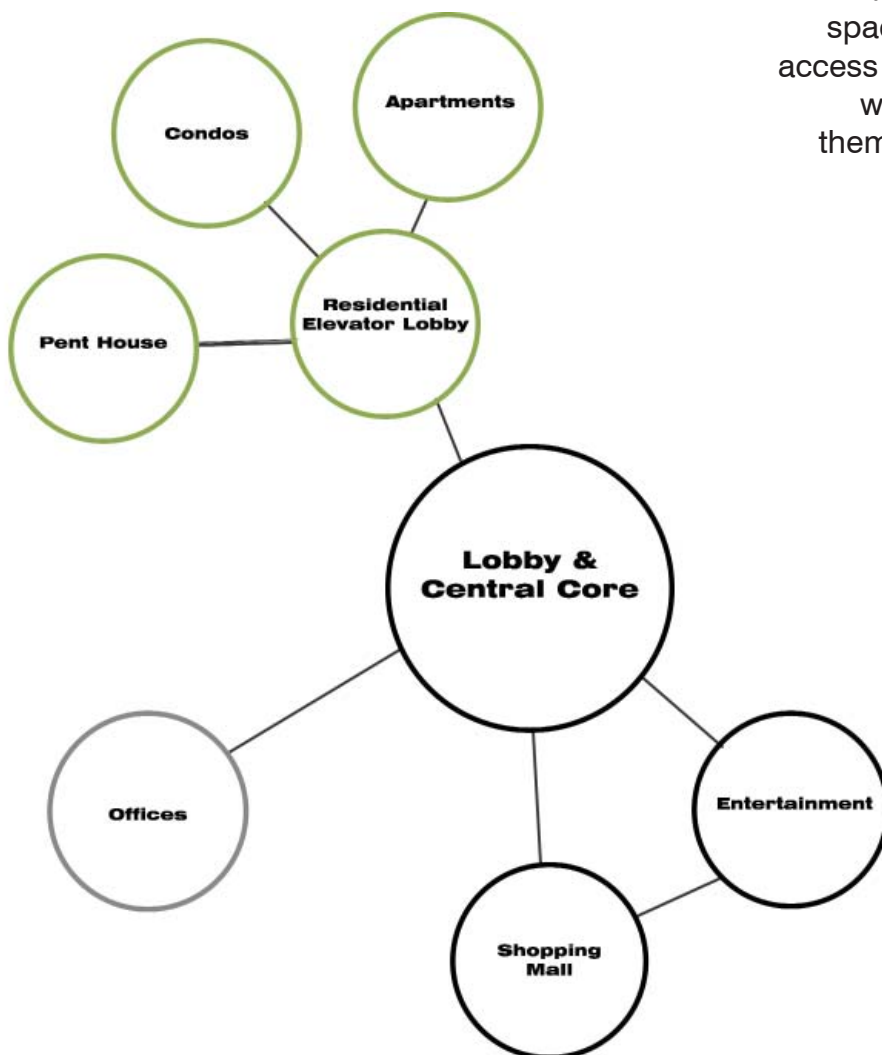
# Gaming Levels



The form of the high rise can be used as an organizational tool as well as a “security” mechanism for advancing levels. Each level will only become available for exploration after the achievement is obtained. The building itself, in this case is the physical manifestation of the game levels. Obtaining these goals and making to the top of the building can be physically seen and followed throughout, creating a vertical ascension to the end target.



The diagram to the left is a simplified bubble diagram and shows how the spaces within the building connect to each other. The green color is the most private spaces (the residential spaces), the gray is the semi private spaces (offices - mostly used for staff, but some clients may have access), and finally the black bubble (the most public spaces). As shown, the different tiers of access to these spaces creates a system in which people cannot get lost and find themselves in the wrong place. It is very organized and efficient.









# Problem Statement

## FUNCTION

Since architecture in video games is becoming arguably just as prevalent as architecture in real life as people are becoming more immersed in virtual reality, the design should create realistic experiences for the users to keep them coming back for more.

Being as faux authenticity is a major goal of the design via virtual reality, the design should create an immersive experience for the users and should be as individualistic and interactive as technologically possible.

Since it is a major concern in video games that there be a continuing progression or flow toward the objective, the design should keep the interest of the users on a fairly strict path toward each smaller goal leading up to the larger end goal while still allowing a considerable amount of free movement around to explore individually.

## FORM

Since an actual site is always an important factor, in this video game the site is an existing site in the city of Los Angeles and will feature the existing buildings and area around it to further simulate the actual city and create an even more realistic environment.

## ECONOMY

Since the entirety is virtual, there are no construction funds necessary, but instead is produced by a video game design crew. The available funds would instead be used to pay salaries, for software, computers, and for physical copies of the game to be produced.

The ultimate financial goal is return on investment, this is what the company's end sights should be set on and correlates on the success of the game itself as well as being able to continue producing popular virtual games.

## TIME

Since it is well known that video games lose their hype quickly after the game has been beaten by a majority of players, the designers must both put all their effort in to creating a game that will take the perfect amount of time to beat as well as moving on quickly to create the next greatest game. It is a fast paced field and must be able to keep up with this quick turnover and constant demand for the next thing.

This thesis aims to design an experience of wayfinding throughout interior architectural spaces using the platform of virtual reality as applied to a videogame. Finding the intended route through a videogame using simple architectural cues becomes the objective just like finding the way through a casino or a museum exhibition.

Instead of designing a space to fit within a defined building form, this thesis looks at designing from the inside based on user experience. This process involves looking at a space from interior perspective views as an overall, and in turn, can become more formal architectural drawings such as floor plans and elevations rather than traditional design methods which usually are designed in an opposite order. Designing in this way allows for fruition of an architectural experience that can be explored through the virtual reality of a videogame, creating a crossover of wayfinding in architecture, videogames, and virtual reality design.



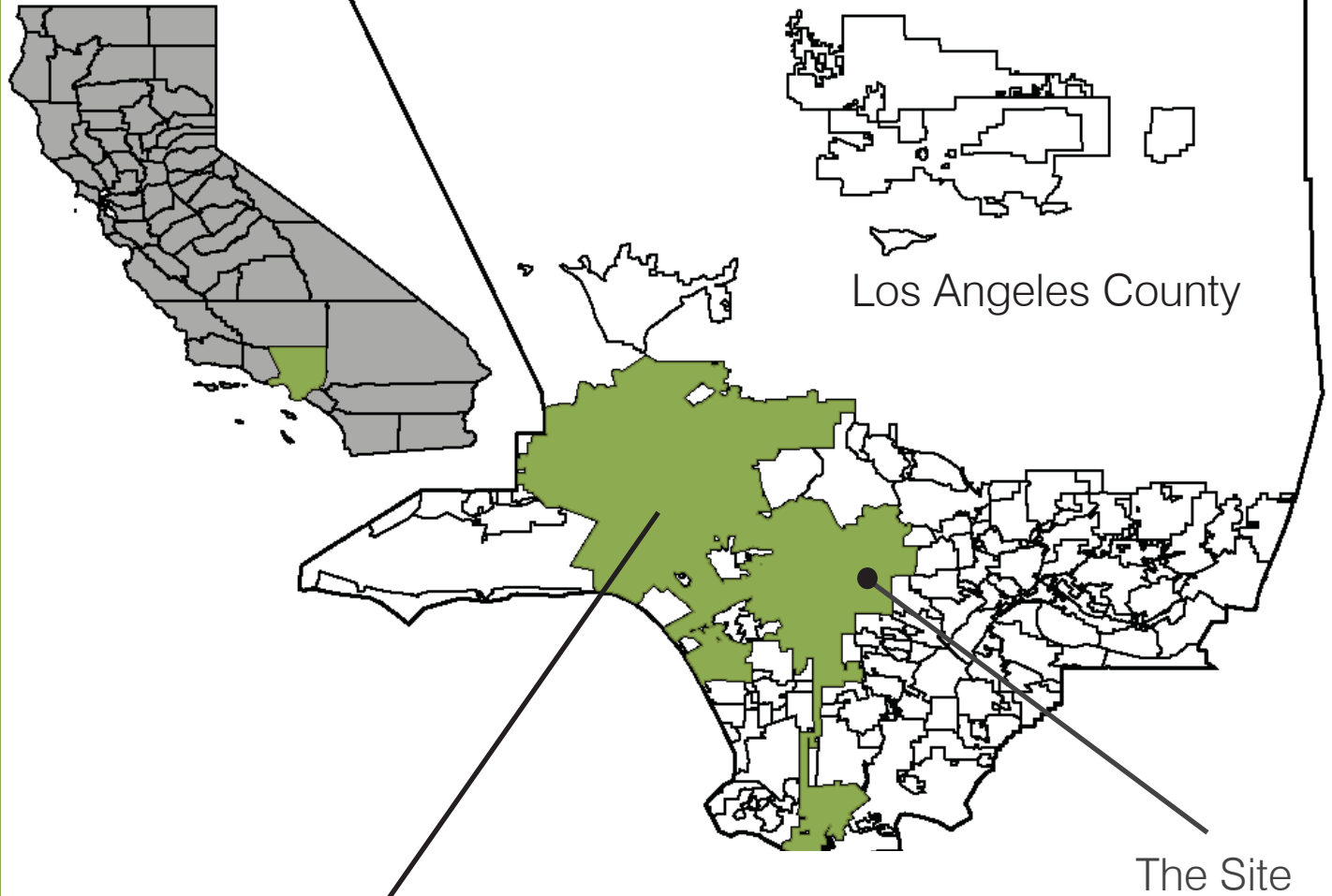




The site, located in the heart of downtown Los Angeles, is the perfect recognizable location for a video game to be set in. This location also allows for the proposed high rise to be in the center of other very unique and varying tall buildings. These buildings are different styles and heights creating even more creative freedom when trying to fit in with the surrounding built environment.

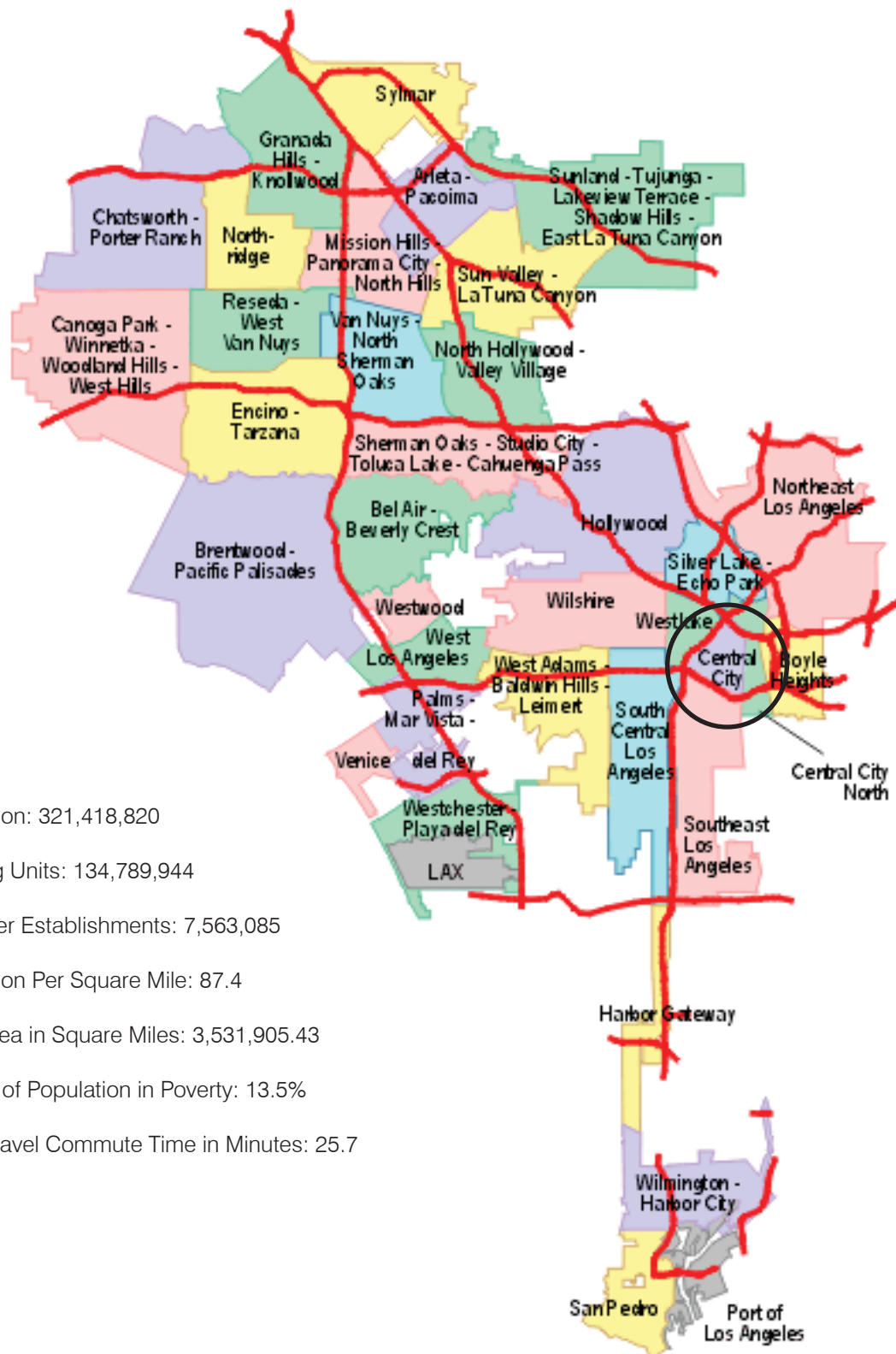
The site was later changed to become more of a virtual environment rather than a specific real site in order to focus more on the methods of wayfinding within a building rather than focusing on where this building would be actually located in the real world.

California



The City of Los Angeles

## The City of Los Angeles



Population: 321,418,820

Housing Units: 134,789,944

Employer Establishments: 7,563,085

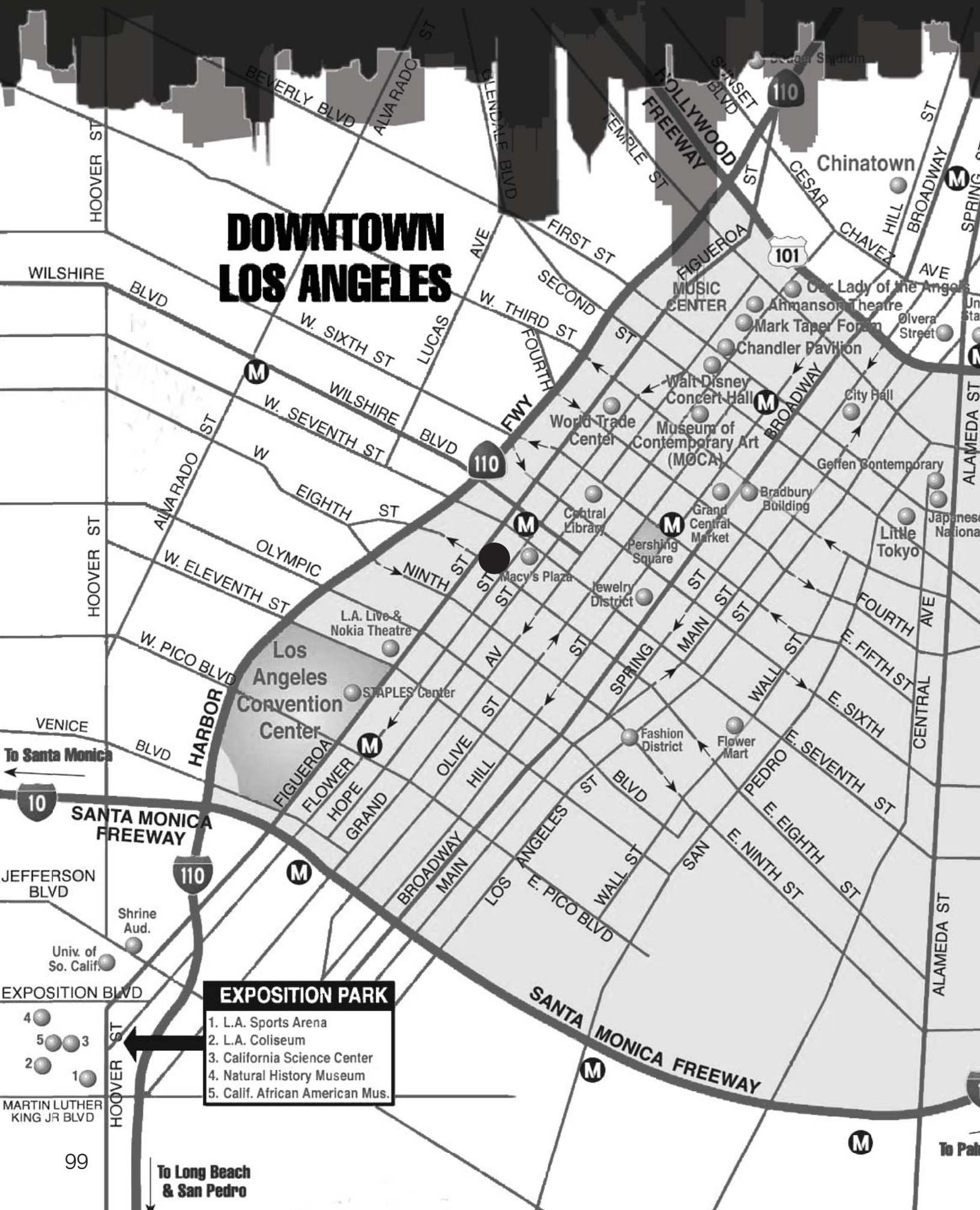
Population Per Square Mile: 87.4

Land Area in Square Miles: 3,531,905.43

Percent of Population in Poverty: 13.5%

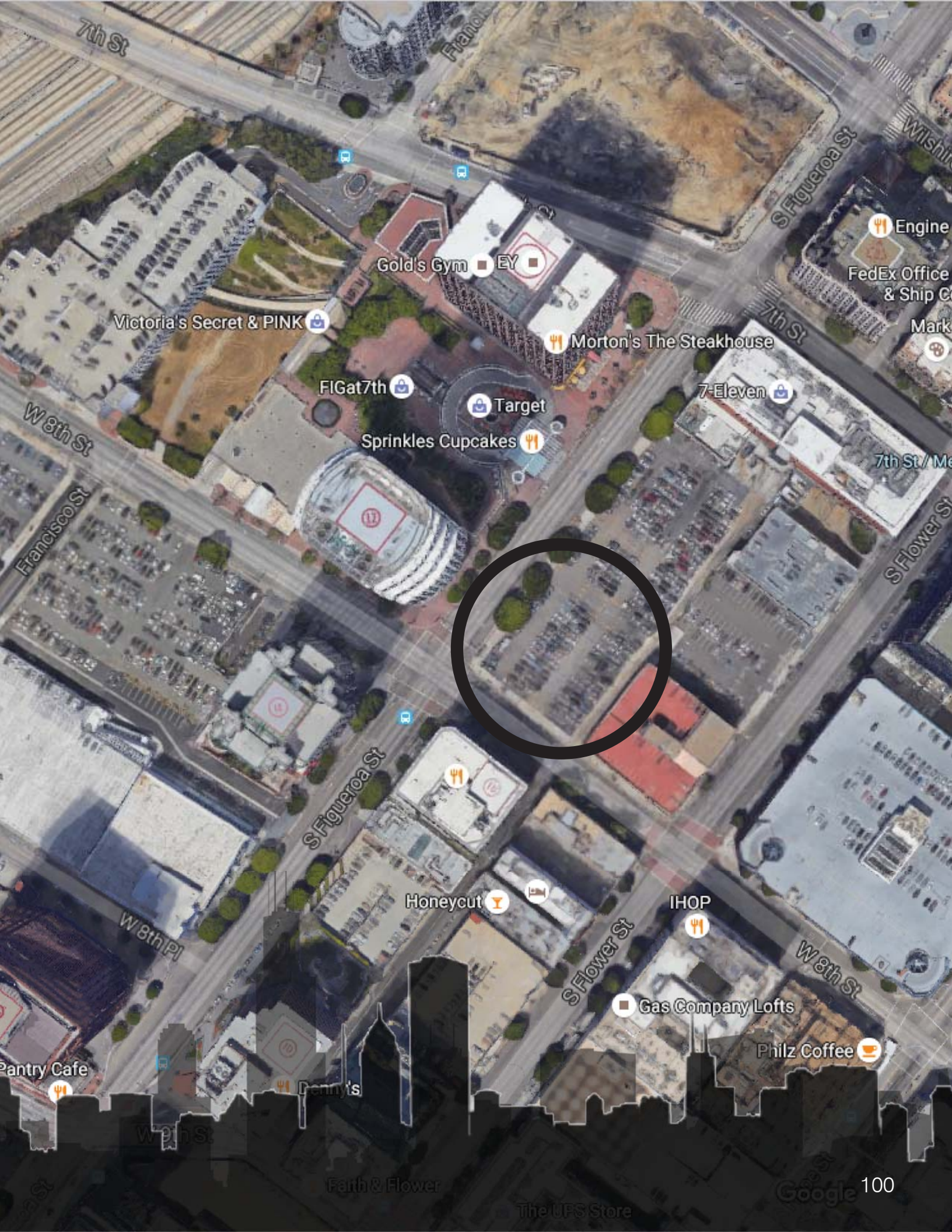
Mean Travel Commute Time in Minutes: 25.7

# DOWNTOWN LOS ANGELES



- EXPOSITION PARK**
1. L.A. Sports Arena
  2. L.A. Coliseum
  3. California Science Center
  4. Natural History Museum
  5. Calif. African American Mus.





Gold's Gym

EY

Victoria's Secret & PINK

FIGat7th

Target

Sprinkles Cupcakes

Morton's The Steakhouse

7-Eleven

FedEx Office & Ship C

Mark

7th St / Me

Honeycut

IHOP

Gas Company Lofts

Philz Coffee

Pantry Cafe

Penny's

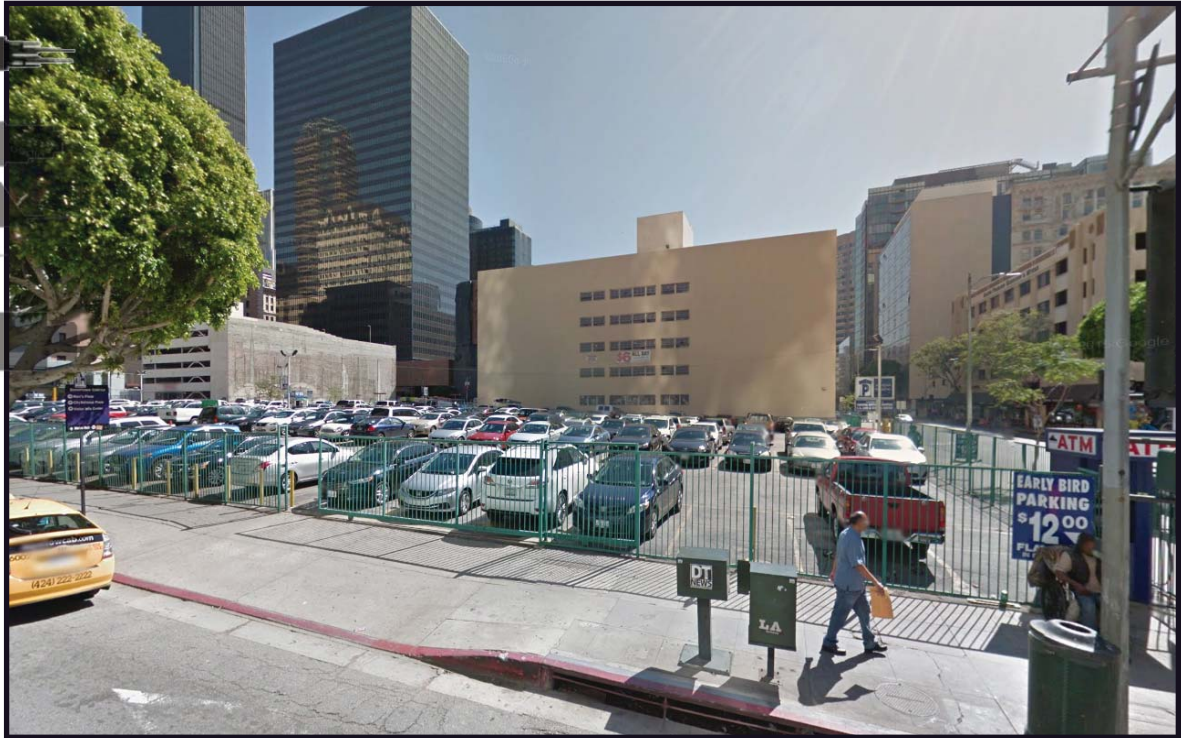
Fair & Flower

The UPS Store

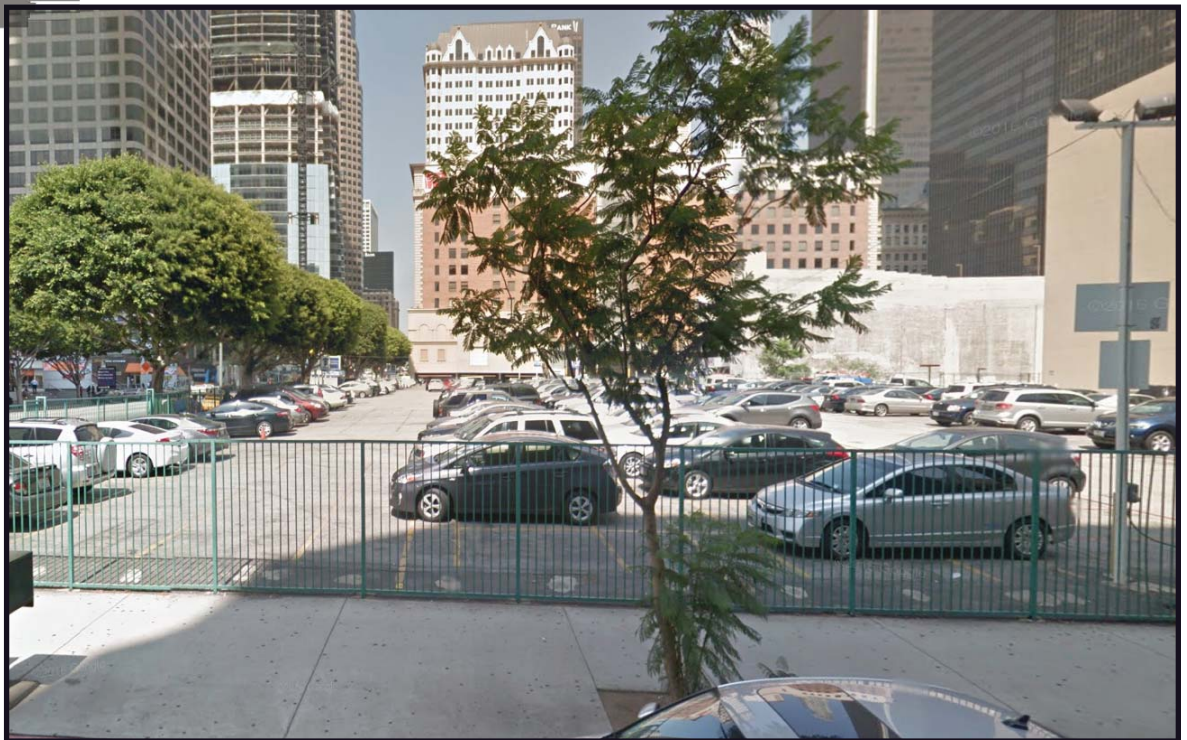
Google

100



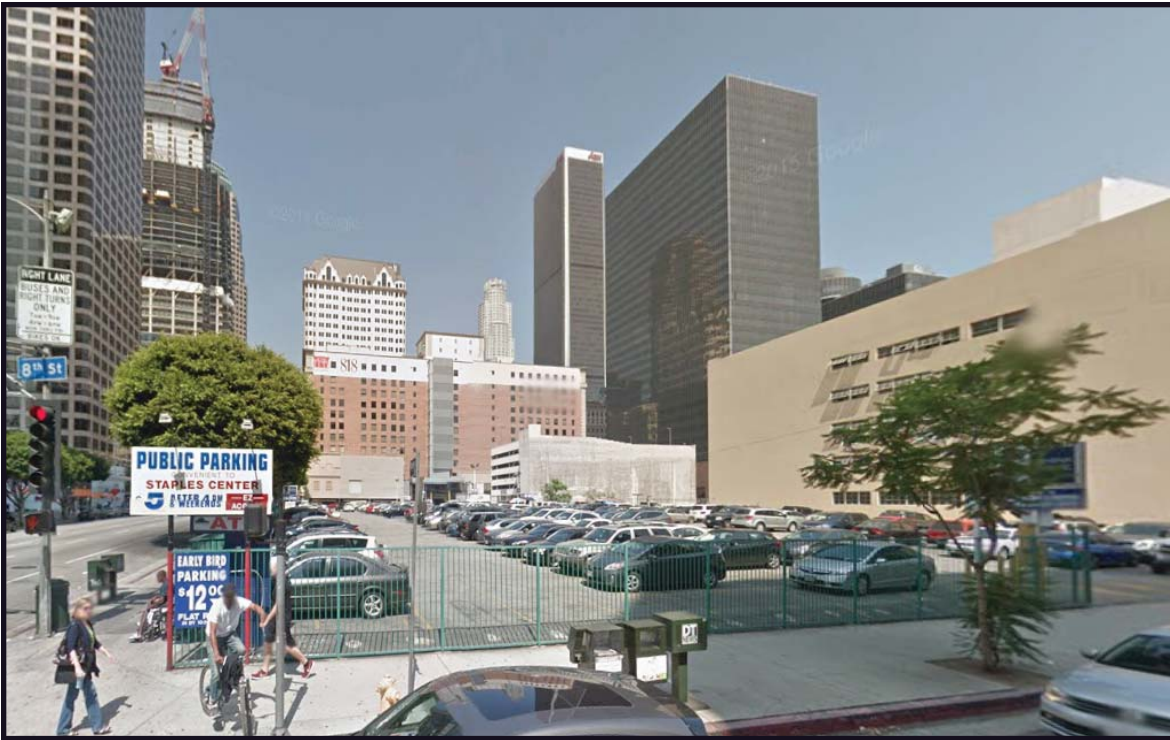


Currently, there is only a parking lot on the site. It is fenced in and very closed off to natural pedestrian cross parking lot activity. Noticing the amount of pedestrian activity on the sidewalks in the area questions why the vehicles need to be used at all.



The parking lot fills up with vehicles due to the amount of activities for people coming into the city, drawing them to this area. This could be more space efficient at the very least within this busy part of the city.



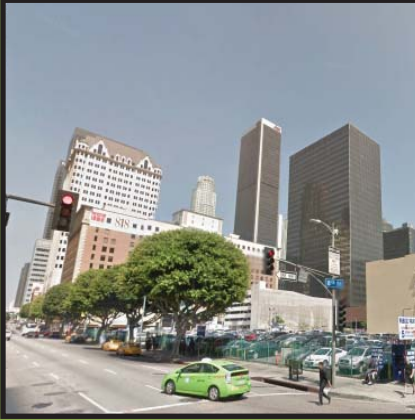


Again, look at the large amount of pedestrian activity. This parking lot runs the entire length of the block and is completely public parking at a rate of \$12.00. This is greatly utilized and can still be utilized while also being more than just another parking lot.

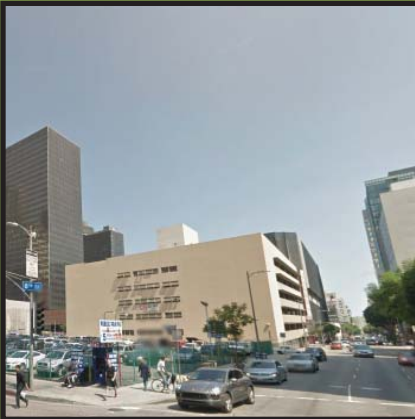


There is a large amount of beautiful vegetation along Figueroa and also along 8th Street. These create a great atmosphere for pedestrians and could become more emphasized.

## Surrounding Buildings



**This is a better view of the trees down Figueroa Street with the backdrop of what buildings will be behind the new one. There are many styles as well as heights and materials. There is not one aesthetic "look" for the whole of the downtown area. This creates a wide array of opportunities of what this building could be. It could be a piece of art, it could be modeled after a historic building, or it could be a glass skyscraper and it would fit with something near it. The challenge is going to be how to make it fit in while still standing out on its own.**

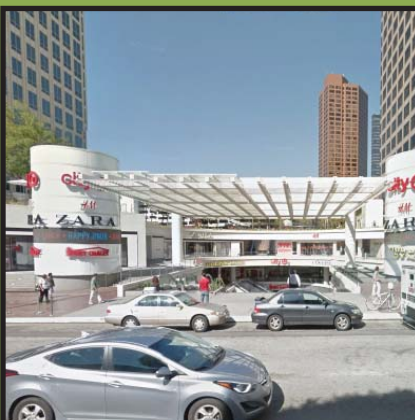


**757 South Flower Street  
98.59 Feet Tall  
22,782.00 Square Feet**

**This building is directly behind the site. It is relatively short as opposed to the various taller buildings around the area. It also looks to have a more natural colored material palette. It looks a little older than a lot of the buildings in the area.**



**View down Figueroa Street: notice the nice sized, healthy trees lining other sides of the street, giving some of these high rise buildings more of a human scale, even from further away. They also make a great natural shading device for pedestrians walking in the hot California sun. Trees thrive year round in this climate, so they should definitely be utilized as much as possible throughout the whole city.**



**This is the shopping center across the street. The shops include: Target City, Zara, Victoria's Secret, Sprinkles, and an outdoor food court. Stepping down into this area creates an outdoor area instead of just another mall. This space is wildly successful and makes for a great area in the city to create more life by architecture. There is also a huge free standing sun shade out to the sidewalk helping to draw people in and down to the shopping areas.**



**801 South Figueroa Street**  
**386.42 Feet Tall**  
**19,053.00 Square Feet**

This building is on the opposite corner of the major intersection of Figueroa and 8th. It is a stand alone piece, being the tallest building in its block. It is the start of the Western side of where the high rise building begin downtown.



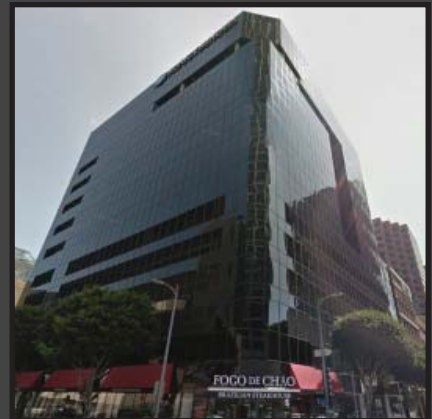
**777 Tower, 777 South Figueroa Street**  
**719.71 Feet Tall**  
**25,551.00 Square Feet**

This building is directly across Figueroa Street from the site. It is the tallest building directly near the site and is about the same goal height for the new building that will be across from it, framing a view of the beyond downtown area.



**800 South Figueroa Street**  
**177.03 Feet Tall**  
**19,610.00 Square Feet**

This building is directly across 8th Street from the site. It is completely different form anything else around. It is this dark black color and will have to be considered if reflective material is used next to it. It also is quite a bit shorter and holds the corner strongly with a Brazilian chain restaurant.

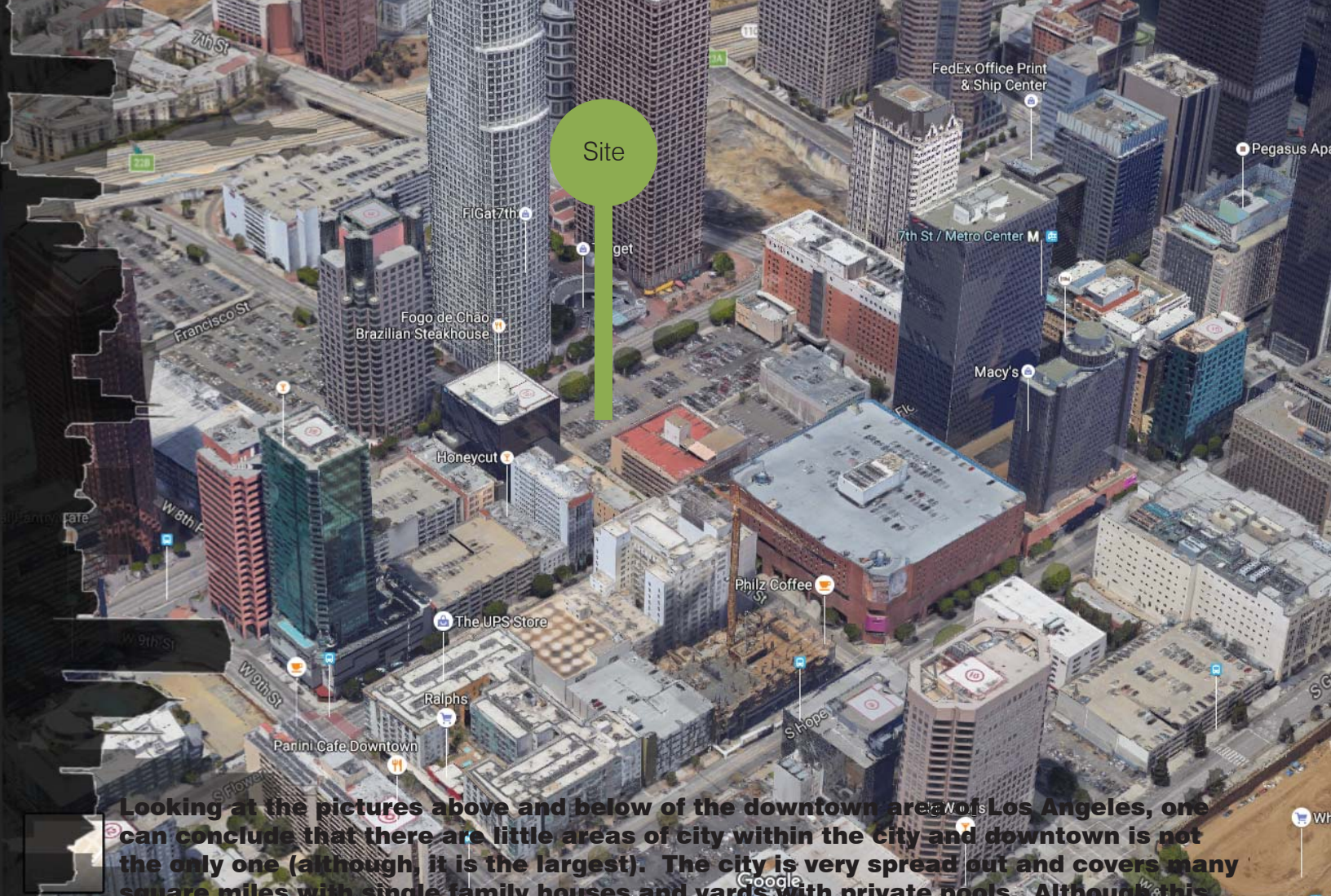


**735 South Figueroa Street**  
**543.60 Feet Tall**  
**24,702.00 Square Feet**

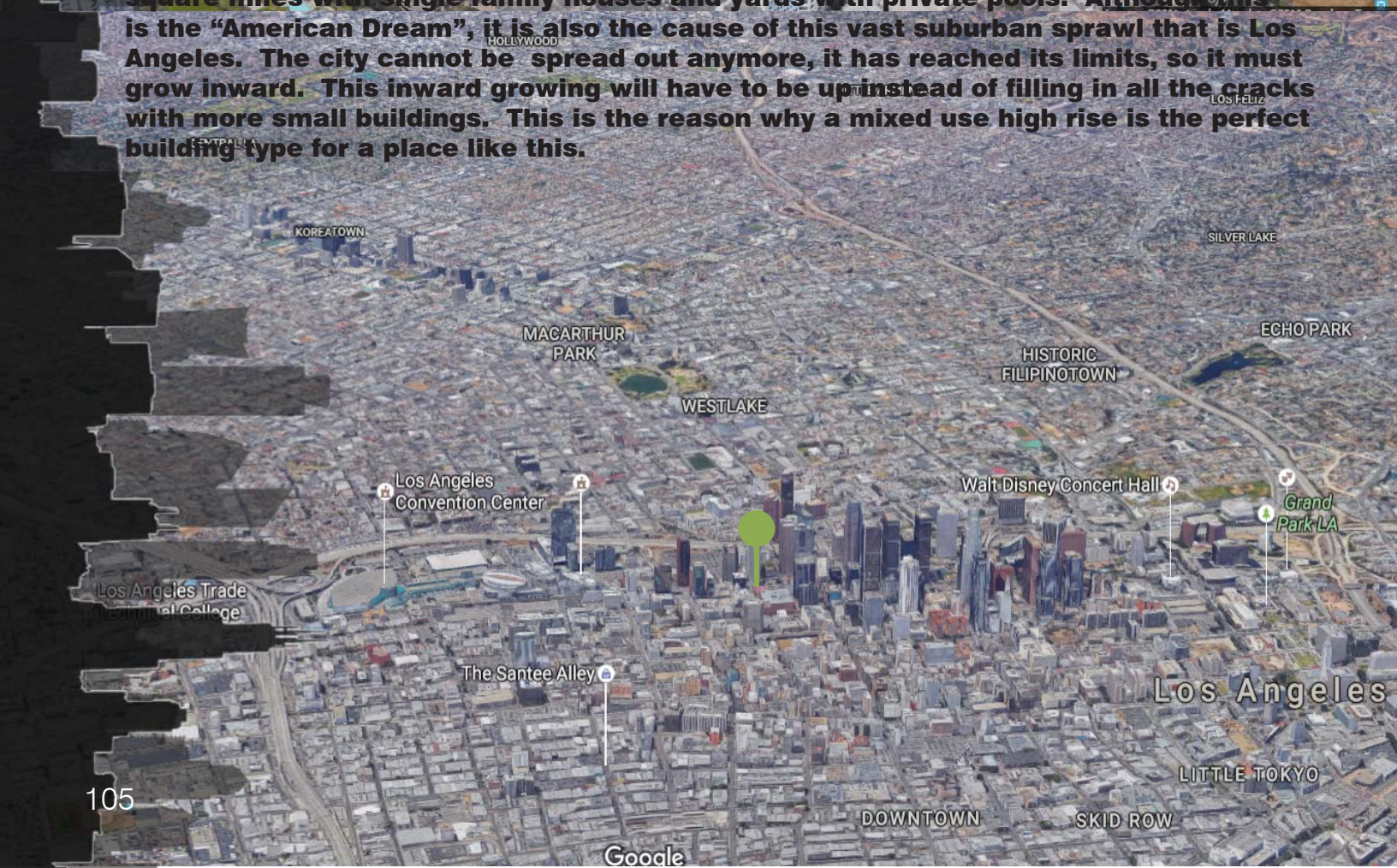
This building is across Figueroa Street from the site. This building seems more generic in form, but reflects the same materials as building 800 (pictured above). The two buildings frame the sunken shopping center between them.





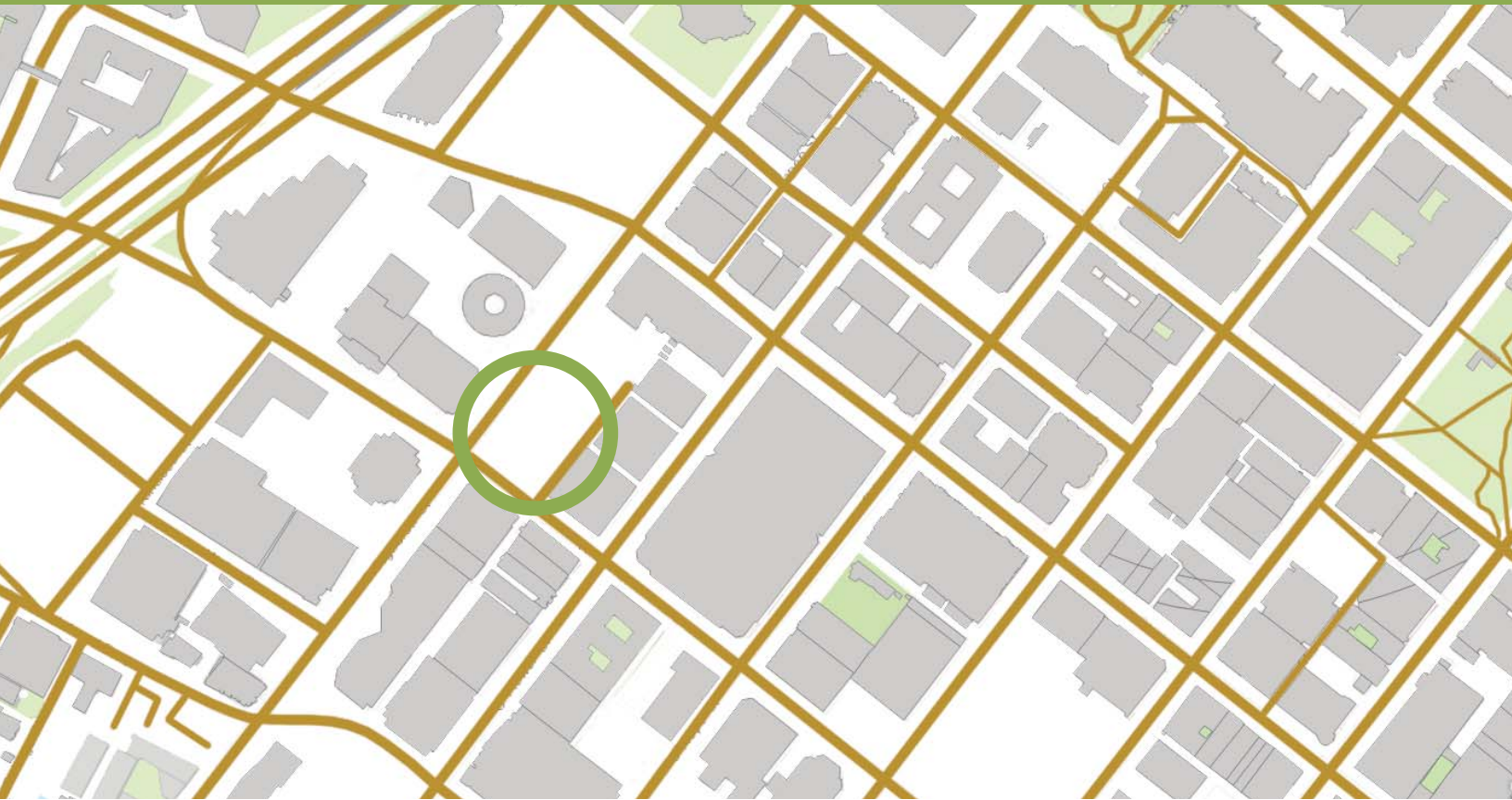


Looking at the pictures above and below of the downtown area of Los Angeles, one can conclude that there are little areas of city within the city and downtown is not the only one (although, it is the largest). The city is very spread out and covers many square miles with single family houses and yards with private pools. Although this is the "American Dream", it is also the cause of this vast suburban sprawl that is Los Angeles. The city cannot be spread out anymore, it has reached its limits, so it must grow inward. This inward growing will have to be up instead of filling in all the cracks with more small buildings. This is the reason why a mixed use high rise is the perfect building type for a place like this.





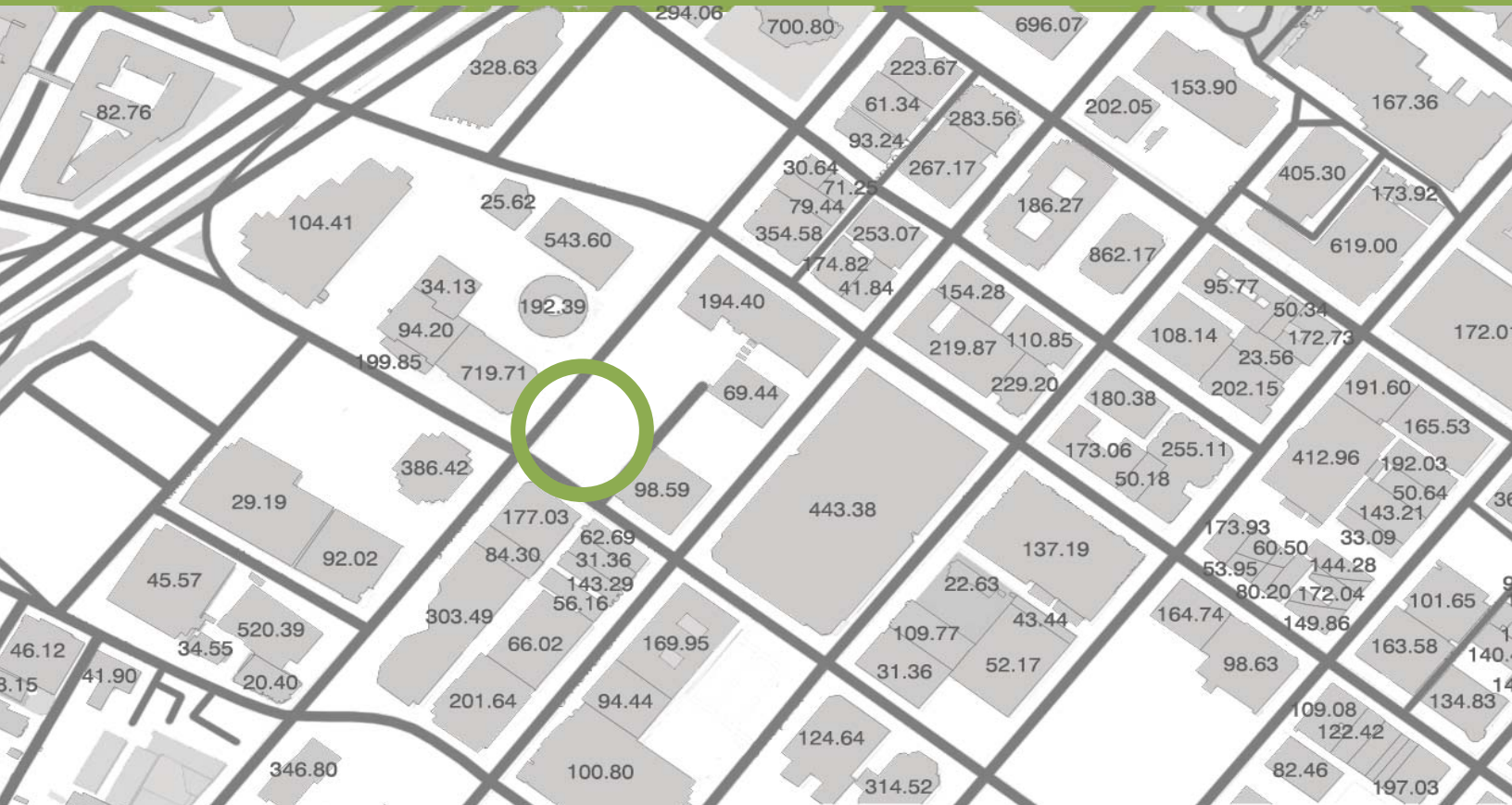
## Figure / Ground



Building footprint size varies hugely in this area and surrounded courtyards are more popular than it appears when walking around the city. This area downtown is all mixed use from shopping and residential to office and sports stadiums. It is a great place to renovate into a pedestrian friendly urban environment and can be greatly improved for navigation within a virtual urban space. This project specifically has to look at how navigation within and around the spaces works and what is most effective for efficient movement.



# Building Heights



The surrounding buildings heights in the downtown area of Los Angeles will influence future design and construction. New buildings must match the existing in aesthetic ways such as height and materials to fit into the existing environment. The site that is circled, is the beginning of where the taller buildings start on Figueroa Street and steadily works its way North. They seem sporadic looking down at them, but when looking at the city, they seem just far enough apart to be individual buildings in the skyline.





# Traffic Patterns

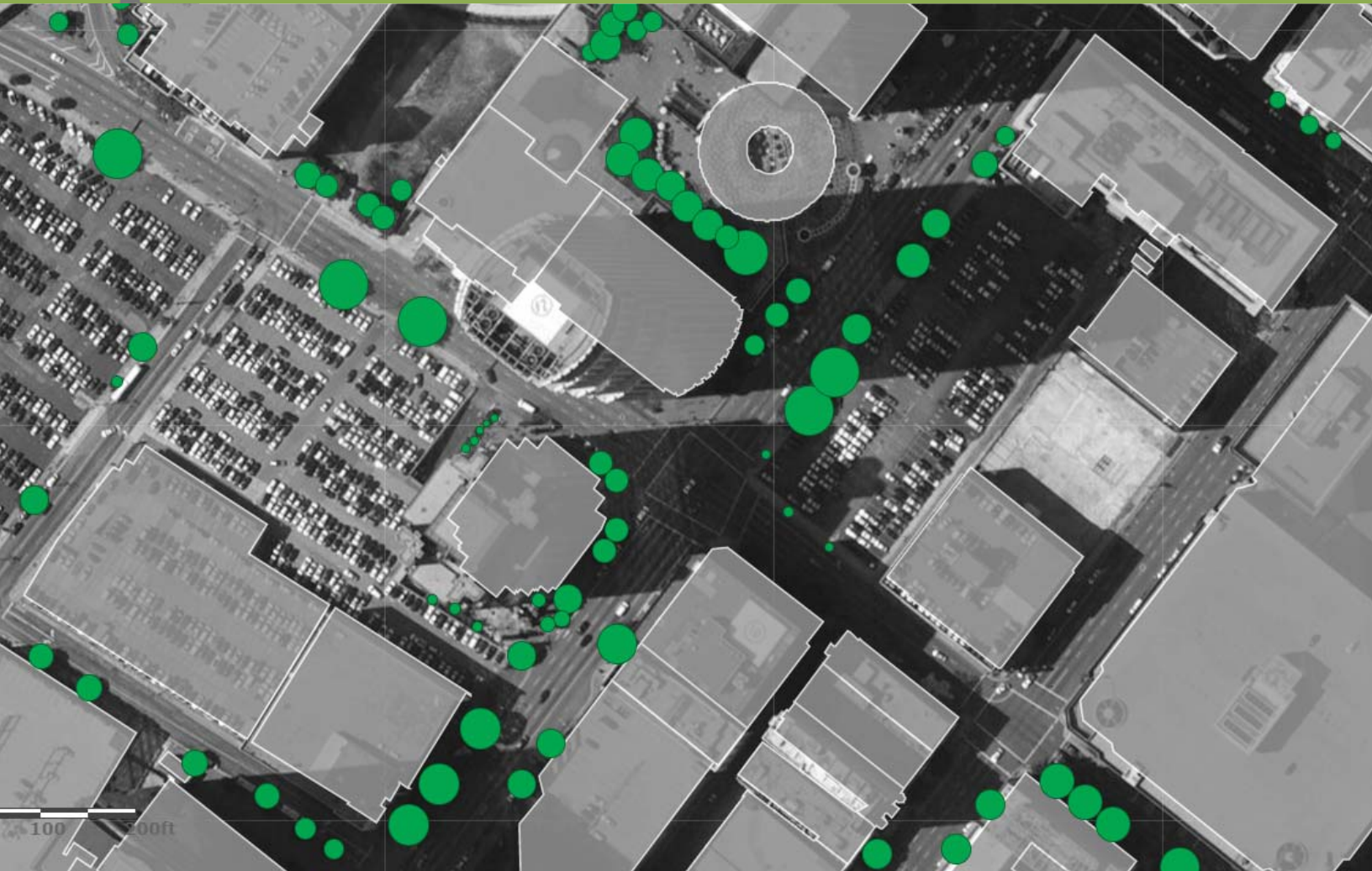


Traffic in Los Angeles is notoriously awful. The roads in dark gray in the image above are the busier roads. The arrows show the streets that are one ways. Figueroa Street (the street the site is located on) is a one way headed North-East. This is a huge factor to consider when designing around a one way street. The traffic is always fairly heavy in this area of the city, so making it more pedestrian friendly will also be something to consider in the design. Obviously one person cannot change the entire city, but a few small changes can help to create a more pedestrian friendly and less traffic dominant city.





## Vegetation / Green Space within the Area



The vegetation in the city of Los Angeles is actually quite dense down the more prominent streets. Figueroa Street being a fairly major street in the city, there are a plethora of trees and vegetation. Consideration will have to be made in order to not disturb the existing trees as well as adding more vegetation to help in creating a more human scale with the high rise that will be a part of this scene soon.





# Building to Parking Lot Ratio



This map looks at the buildings vs the parking areas of this particular part of the city. There seem to be a lot of large vast parking lots filled with cars. There are much more efficient ways to use this valuable city space. This could be solved by parking ramps/structures or underground parking with the above ground space and hidden parking. This city could use some more beautification as well as less cars and traffic in general. The streets are already unnaturally wide for efficient pedestrian use as well as normally packed with cars all trying to get places. The point of this proposal is to not add to this growing problem, but instead find a way to fix it. With the city now having to grow inward, these spaces will have to become better utilized.





# Surrounding Amenities

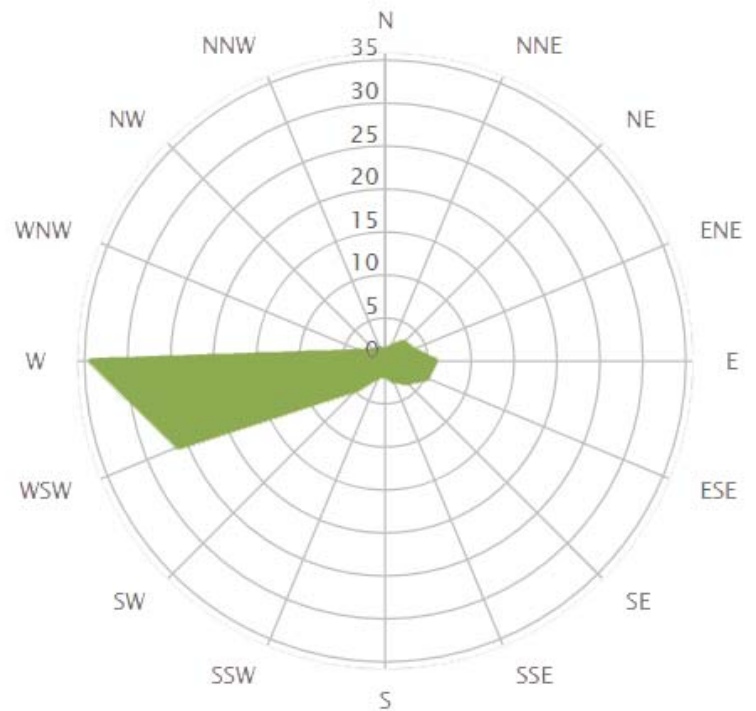
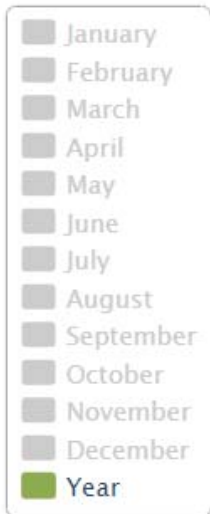


The amenities in an area where a partial residential building is being proposed should look at what is nearby for the residents as well as what is still needed that could be added into the lower part of the building where commercial activity will take place. There are an enormous amount of restaurants, with fewer grocery stores and coffee shops within the area. Notice also how many metro stops there are. This is a great base for residents to get to other parts of the city without having to own a car.



# Wind and Weather

Wind direction distribution in (%)  
Year

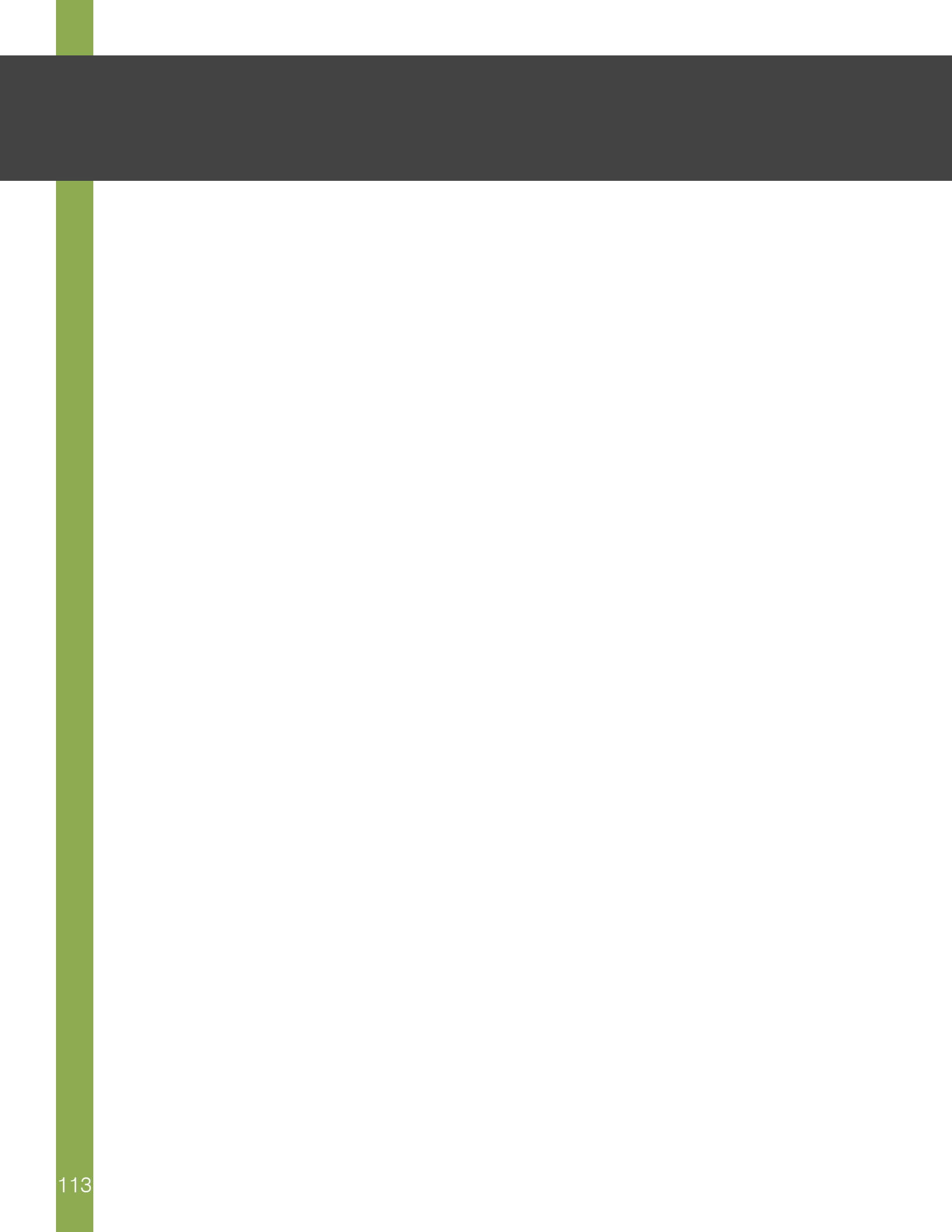


Due to being on the coast, the wind always comes from the West. This makes for a rather mild and predictable temperate climate. The fluctuation of seasons is also very small due to being closer to the equator in Southern California. The temperature is comfortable year round and there is very little risk of freeze/thaw. This area also has seismic activity, which needs to be taken into consideration. All of these factors will significantly effect the design of the building. Things to consider include: Sun shading, insulating to keep the heat out, cooling systems, night flush cooling, and many more.

## Climate Los Angeles - California

°C | °F

	Jan	Feb	Mar	Apr	May	Jun
Average high in °F:	67	67	67	69	70	73
Average low in °F:	51	51	51	53	56	58
Av. precipitation in inch:	3.98	5.08	2.83	0.98	0.31	0.12





The codes that have to be incorporated in this specific design of a high rise in the state of California are quite different from other places in the world. The state code of CALGreen has to be incorporated as well as thinking about seismic activity and being near the coast. In order to create an unlimited height and square footage, the building must have a noncombustible structure and be sprinkled. ADA requirements are also very important when it comes to design in order to create an equal and open environment to all.

Even though this information was not used for the videogame in the end, this was an important process to go through and understand how the code in Los Angeles, California works.

# Business

The bottom 50% of this building will include retail, restaurants, and offices. This section of the building must be classified as business under the International Building Code.

## Occupancy Load



1000+ People



Per 100,000+ Square Feet

**Max Exit Width: 25' (About 9-36" Doors)**

**Max Exit Access Travel Distance: 300'**

# Residential

The top 50% of this building will include a mixture of different residential units. These will include both small affordable apartments to privately owned condominiums.

## Occupancy Load



500+ People

Per 100,000+ Square Feet

**Max Exit Width: 12.5' (About 4-36" Doors)**

**Max Exit Access Travel Distance: 250'**



## Location: Los Angeles, California

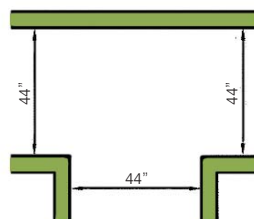
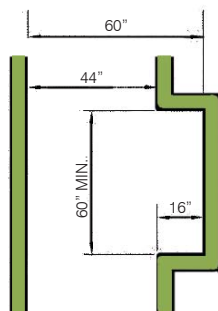
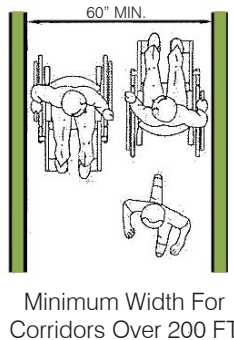
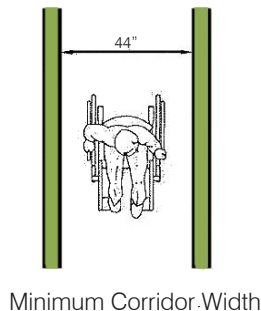
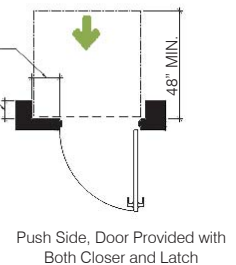
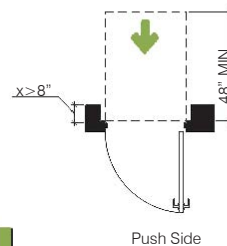
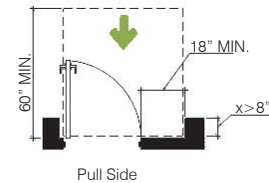
Special Consideration: Must follow CalGreen in addition to the IBC

### Type I Construction - Sprinkled

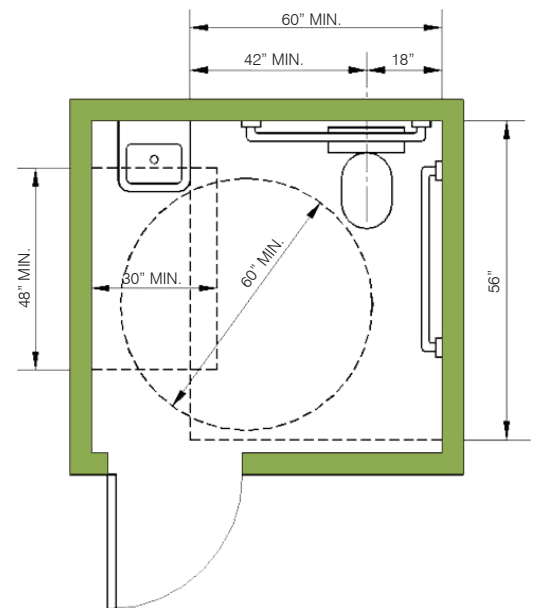
Type I Construction are those types of construction in which building elements are noncombustible. In this case, a steel building with a noncombustible interior and exterior. Also choosing to sprinkle the whole building creates the option of an unlimited maximum height and square footage per ground floor. For the purpose of this exercise, the estimated square footage of the entire building is about 200,000 square feet, 100,000 sf for business and 100,000 sf for residential. Although this is unlimited, there are zoning restrictions as to how high the building can be that have to be followed and will ultimately decide the height.

ADA requirements are some of the most important basic layout codes for both business and residential buildings.

#### Door Swing Requirements



Passing Alcoves for Corridors Over 200' in Lieu of 60" Min. Width



ADA Bathroom Layout



## Definitions of Research Direction

For a research direction, the plan is for most of the research to occur during the beginning of the semester to allow for more time in the design and compilation phases of the project. This seems to be fair due to most of Fall semester being general research on the topics. The only research that may continue to happen throughout the semester are small specific topics that may need in depth focus. These will be addressed as they arise. The research that will be conducted will be a combination of the descriptive strategies method and the evaluation and diagnosis method.

## Design Methodology

The research methodologies that would work best for this design thesis are Descriptive Research and Evaluations and Diagnosis. Using these two research methods, the evaluation of architecture within video game design can be further evaluated and critiqued by not only people trained in design, but by the average user as well and the information collected and analyzed can be used to create a more developed and adaptable environment that will do something to please more of the populous using the game. Gaining the perspectives of several disciplines of people will allow for a more open mind in the design process and allow for different perspectives to all have a satisfactory result for an end product.

The surveys did not become a reality being as there were too many variables and needing to move on to the design phase of the project as fast as possible in order to finish the project in time.

## Plan for Documenting the Design Process

Documentation of the design process will include inspiration, sketches, drawings, photographs, digital models and process videos. Documentation will take place throughout the entirety of the thesis project to capture all phases of the design process as well as documenting changes and decisions made. These will all be stored digitally for use within the final thesis book as a part of visually explaining the process that brought the project to fruition. The book will then be physically published as well as being made accessible through the Institutional Repository at North Dakota State University.

## December 2016

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16 Last Day of Fall Semester	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

www.BlenkCalendarPages.com

### Weekly Goals:

**18th - 24th:** (pre-semester) Research / Conduct Direct Personal Observation / Schematic Design  
Contact Sources from Mike. Contact professionals. Review Context and Site Analysis.

**25th - 31st:** (pre-semester) Research / Conduct Questionnaires / Concept and Schematic Design  
Continue contact with sources. Continue discussion with professionals. Start on recommended case studies by individuals and professionals.



## January 2017

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1	2	3	4	5	6	7
8	9 First Day of Spring Semester	10	11	12	13 WEEKLY REVIEW	14
15	16 MLK Holiday (No School)	17	18	19	20 WEEKLY REVIEW	21
22	23	24	25	26	27 WEEKLY REVIEW	28
29	30	31				

www.BienkCalendarPages.com

### Weekly Goals:

**1st - 7th:** (pre-semester) Research / Conduct Questionnaires (pull together all answers from questionnaires and surveys) / Schematic Design / Small discussion with professionals (if necessary) Floor Plan Development.

**8th - 14th:** (wk 1) Have a significant initial design in progress (have enough done for review) Have softwares and hardwares picked out for incorporation into design immediately (will pick after research and discussion with professionals) Floor Plan Development and Digital Model Development.

**15th - 21st:** (wk 2) Progress in design / keep researching & reading suggested reading. Digital Model Development.

**22nd - 28th:** (wk 3) Progress in design / keep researching / Go through structure and envelope.

**29th - 31st:** (wk 4) Progress in design and be finished with research (apply to design). Go through structure and envelope.

February 2017						
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
			1	2	3 WEEKLY REVIEW	4
5	6	7	8	9	10 WEEKLY REVIEW	11
12	13	14	15	16	17 WEEKLY REVIEW	18
19	20 Presidents Day (No School)	21	22	23	24 WEEKLY REVIEW	25
26	27	28				

## Weekly Goals:

**1st - 4th:** (wk 4) Progress in design and be finished with research (apply to design). Go through structure and envelope.

**5th - 11th:** (wk 5) Significant progress in design (30% done at least). Material choices made this week.

**12th - 18th:** (wk 6) Significant progress in design (50% done at least). Passive and Active System Choices made and integrated fully within.

**19th - 25th:** (wk 7) Significant progress in design (75% done at least). Integrate all systems and processes within the digital model.

**26th - 28th:** (wk 8) Be 99% complete with design at minimum. Final touches on midterm presentation.

March 2017						
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
			1	2	3 WEEKLY REVIEW	4
5	6	7	8	9	10 WEEKLY REVIEW	11
12	13	14	15	16	17	18
-----Spring Break Week-----						
19	20	21	22	23	24 WEEKLY REVIEW	25
26	27	28	29	30	31 WEEKLY REVIEW	

www.BlankCalendarPages.com

## Weekly Goals:

**1st - 4th:** (wk 8) Be 99% complete with design at minimum. Final touches on midterm presentation.

**5th - 11th:** (wk 9) Mid Semester Thesis Reviews (be done with design).

**12th - 18th:** (Spring Break) Project Revisions after midterm reviews (bring design up to 100%)

**19th - 25th:** (wk 10) Compiling research and design things for final book. Work on Renderings / Full Digital Development.

**26th - 31st:** (wk 11) Book compilation and final touches (book 50% done). Work on Renderings / Full Digital Development.

April 2017						
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
30						1
2	3	4	5	6	7 WEEKLY REVIEW	8
9	10	11	12	13	14 Easter Holiday (No School)	15
16	17 Easter Holiday (No School)	18	19	20 Final Exhibits in Digital Form Due (5pm)	21	22
23	24 Final Exhibits in Physical Form Due (9am)	25	26	27	28	29
						<small>www.BlanckCalendarPages.com</small>

## Weekly Goals:

**1st:** (wk 11) Book compilation and final touches (book 50% done)

**2nd - 8th:** (wk 12) Book compilation and final touches (book 50% done) Also Finalizing Images and Videos.

**9th - 15th:** (wk 13) Production Week Finalizing Images and Videos.

**16th - 22nd:** (wk 14) Last Week of Production. Make all Physical Boards Etc...

**23rd - 29th:** (wk 15) Install Final Presentation.

**30th:** (wk 16) Final Touches

May 2017						
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
	1	2	3	4	5 Last Day of Classes / Awards Ceremony	6
	-----FINAL THESIS REVIEWS-----					
7	8 Digital Copy of Thesis Documentation Due	9	10	11	12 Final Thesis Document Due in the Institutional Repository	13 Graduation
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

www.BlanckCalendarPages.com

## Weekly Goals:

**1st - 6th:** (wk 16) Final Thesis Reviews finish everything and tie up all loose ends (also send thank you's for a successful semester and thesis project)

**7th - 13th:** (wk 17) Turn in all thesis documentation.



## **Sample Questionnaire:**

**Looking at the architectural environment of video games, what do you like about it?**

**Dislike about it / Wish you could do within in?**

**How is the graphic display quality on your favorite 3 games (name & rate on a scale of 1 to 10).**

**How interactive is the environment in those 3 games(name and rate on a scale of 1 to 10) and best interactive feature of the environment?**

**Of those 3 games and others, on average how many hours do you play a week?**

**What helps you to choose a video game to buy? Marketing? Plot? Design features? Premise?**

**Name:**

**Age:**

## Sample Survey:

**After playing a video game, rate the following things:**

**Name:**

**Age:**

Name of Video game played: \_\_\_\_\_

**1 = Very Bad**

**5 = Great!**

Graphic Quality \_\_\_\_\_

**1**

**2**

**3**

**4**

**5**

Quality of the Architectural Environment \_\_\_\_\_

**1**

**2**

**3**

**4**

**5**

Entertainment \_\_\_\_\_

**1**

**2**

**3**

**4**

**5**

Virtual Realistic-ness \_\_\_\_\_

**1**

**2**

**3**

**4**

**5**

Quality of the overall video game design \_\_\_\_\_

**1**

**2**

**3**

**4**

**5**

How interactive the environment in the video game is \_\_\_\_\_

**1**

**2**

**3**

**4**

**5**

Overall video game score (experience) \_\_\_\_\_

**1**

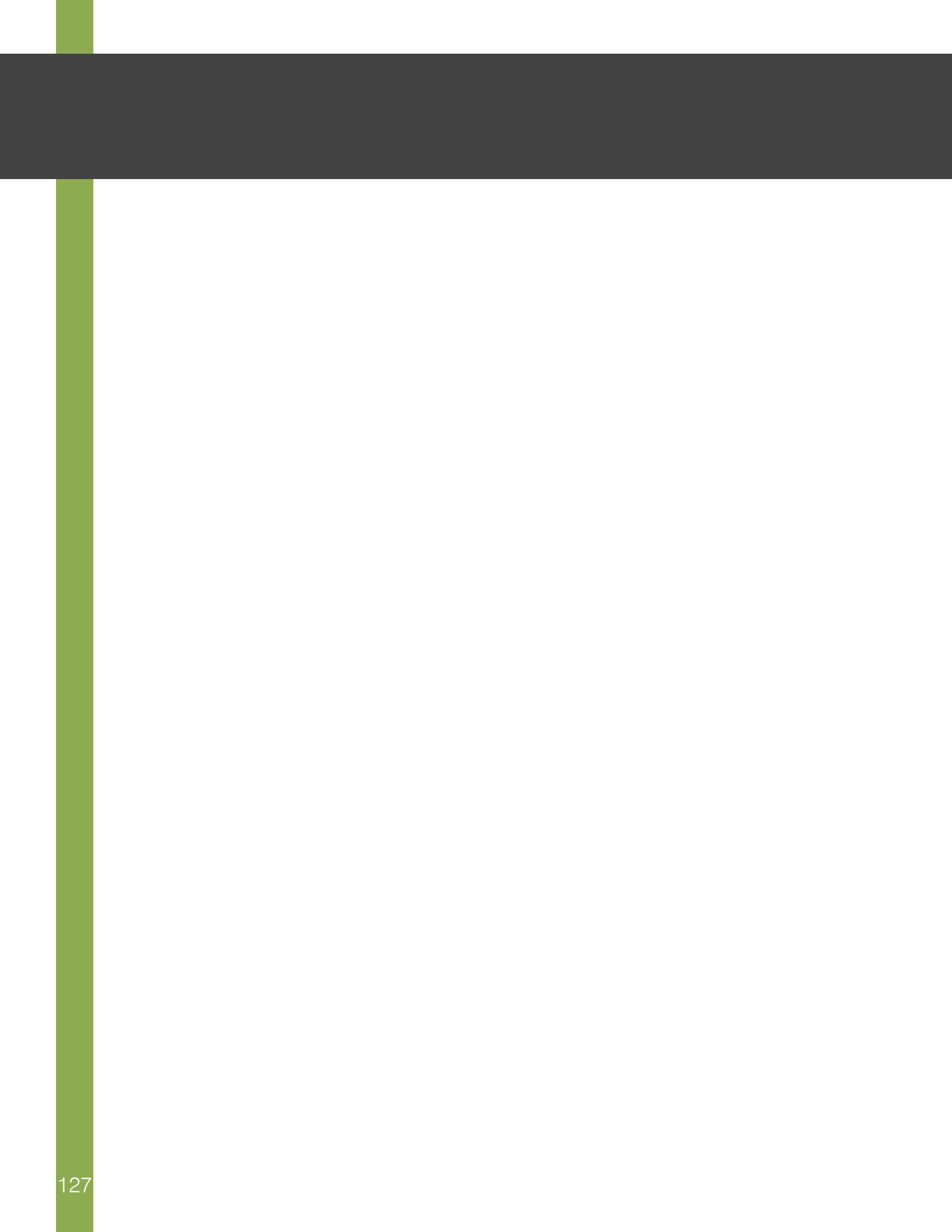
**2**

**3**

**4**

**5**

**Additional Comments / Do you think that the quality in which you played today factored into this survey at all? Had you done better or worse would the outcome of the survey be different?**



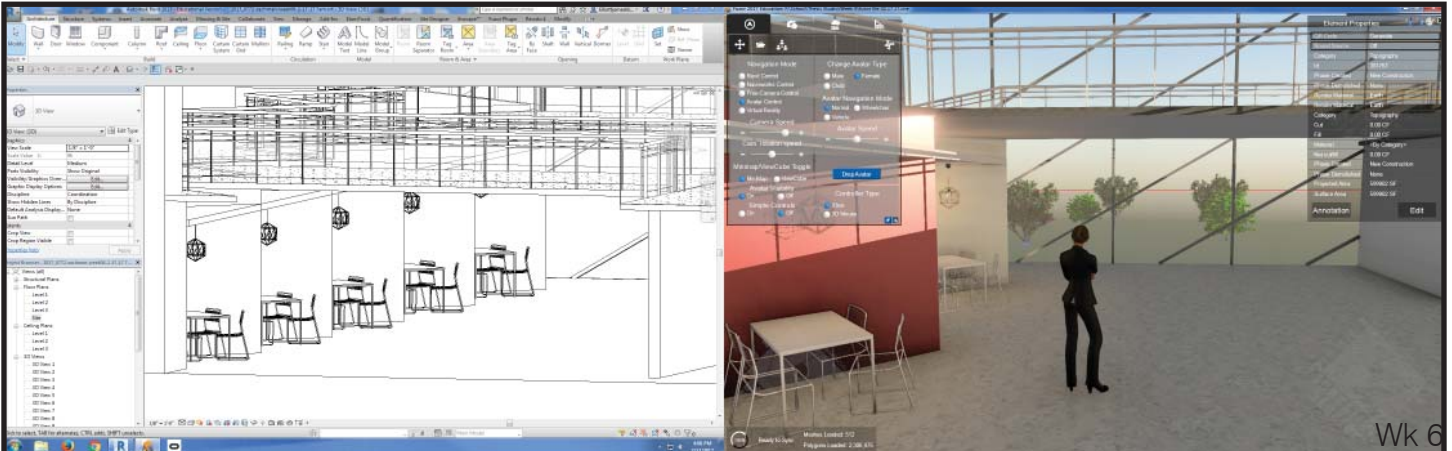
# Process Documentation

## Weeks 1-5





# Weeks 6-10



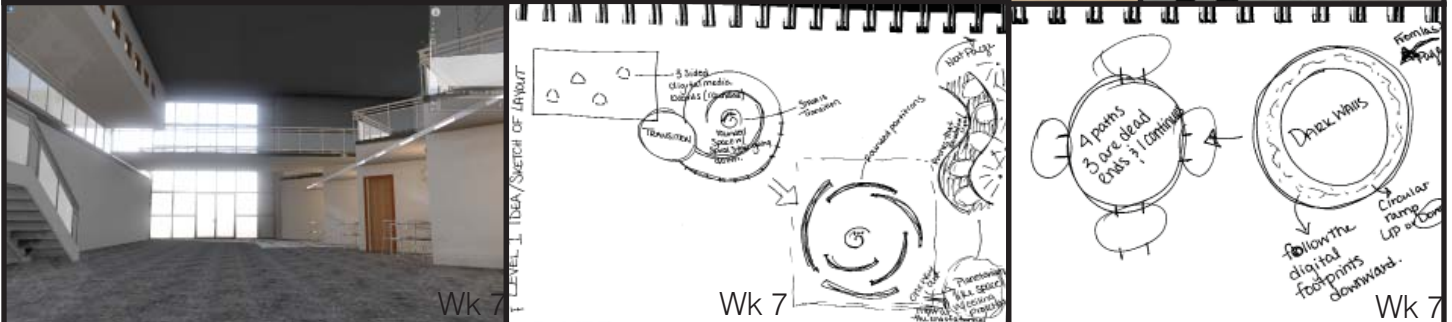
Wk 6



Wk 6

Wk 6

Wk 6



Wk 7

Wk 7

Wk 7

### THEMES OF levels

- Curves & Digital Color  
*Materials/Elements:*  
Curious Music, White Walls, Moving Colored Visuals or one color.
- Lines & Monotone  
*Materials/Elements:*  
Concrete, White light, Quiet footsteps
- Volumes of Spaces, Compression & release  
*Transition:*  
like a zipper  
↑  
VOLUME WITHIN
- Child-like Playfulness??  
Shapes & bright colors
- Textures (visual perception of textures)  
Follow one texture throughout whether it be ceiling, wall, or floor

**UP NEXT:**  
Think About Transition Spaces  
- between visual rooms  
- between themed levels.

### MID-TERM REVIEWS:

**My Process:**

THE EXPERIENCE OF ARCHITECTURE THROUGH VR & VIDEOGAMES

Project Goals:

- LEVEL 1: Curves & Digital Color
- LEVEL 2: Lines / Monotone
- LEVEL 3: Volumes of Space
- LEVEL 4: VISUAL TEXTURES
- LEVEL 5: SHAPE & Color.

**VIDEO RECORDING MONTAGE OF LEVELS & How They are coming along**

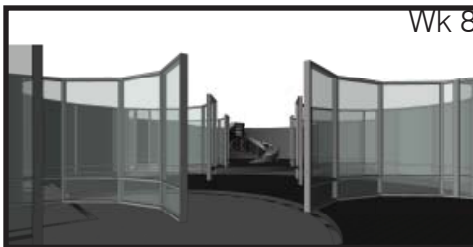
Some Slides talking about the topic

MODEL LEVEL 1, MODEL LEVEL 2, MODEL LEVEL 3

Wk 7

Wk 8

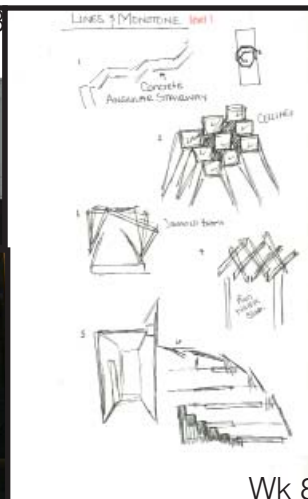
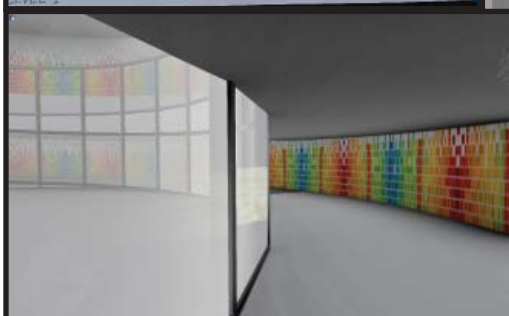




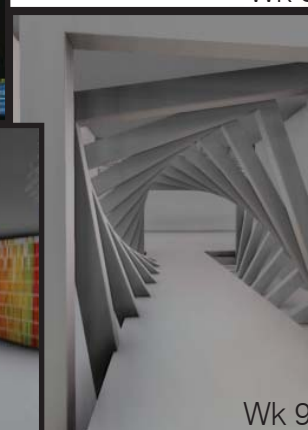
Wk 8



Wk 9



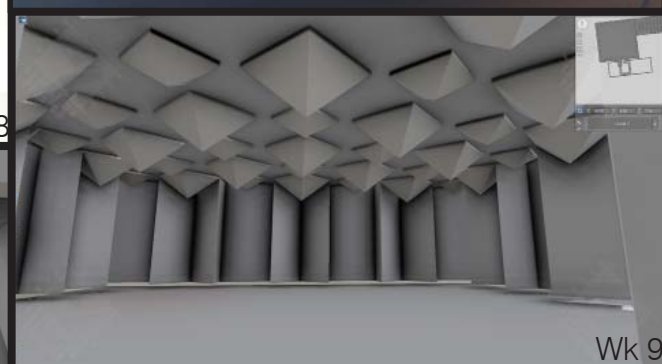
Wk 8



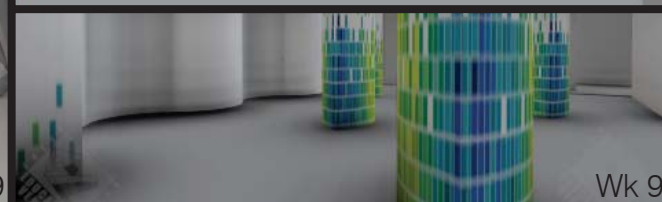
Wk 9



Wk 9



Wk 9



Wk 9

Wayfinding definitions:

dictionary.com

Wayfinding  
noun  
Signs, maps, and other graphic or audible methods used to convey location and directions to travelers;  
- also written way-finding  
Coined by Kevin Lynch  
(American urban planner & author)

Wikipedia

Wayfinding encompasses all of the ways in which people (and animals) orient themselves in physical space and navigate from place to place.

Basic Process

1. Orientation - is the attempt to determine one's location in relation to a point of reference (usually a destination)
2. Route Decision - is the selection of a route & of direction to the activity
3. Route Monitoring - is checking to make sure that the selected route is heading towards the destination
4. Destination Recognition - is when the destination is recognized

Modern Usage of the Term:  
(in the context of architecture)  
- refers to the user experience of orientation and choosing a path within the built environment.

Segd.org

Wayfinding refers to information systems that guide people through a physical environment and enhance their understanding and experience of a space.

Wk 10

Bringing 3 main elements together:

- ▶ WAYFINDING
- ▶ VIRTUAL REALITY
- ▶ VIDEOGAME DESIGN.

With these three, I will explore the concept of how with the use of wayfinding

#Immersion of virtual reality

Can then make into physical models to see the interior spaces.

Question could be asked: why a videogame?

find a way to fully explain this. In a videogame is is basically a virtual world that is created to be explored and can be broken down into its most basic elements.

5 cubes - ideally 100' x 100' x 100'

5 objectives (each has 8 "levels") - to make a perfect cube.

level? Objective? } wording must make the challenge? } concept clear

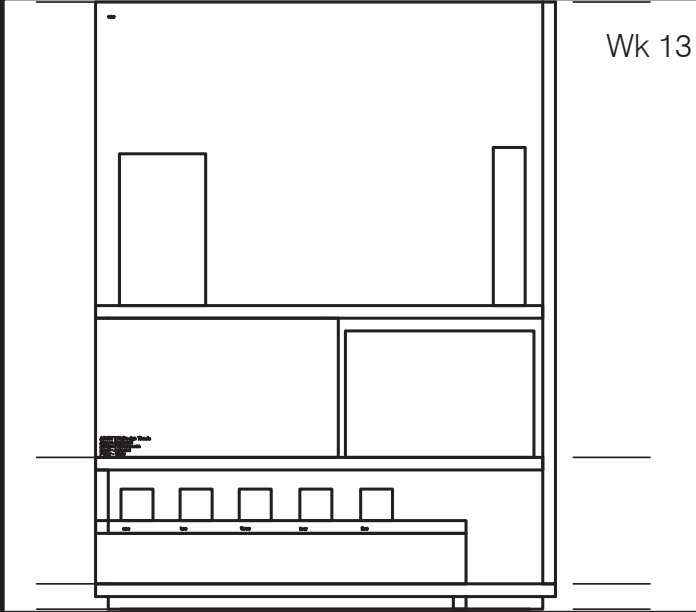
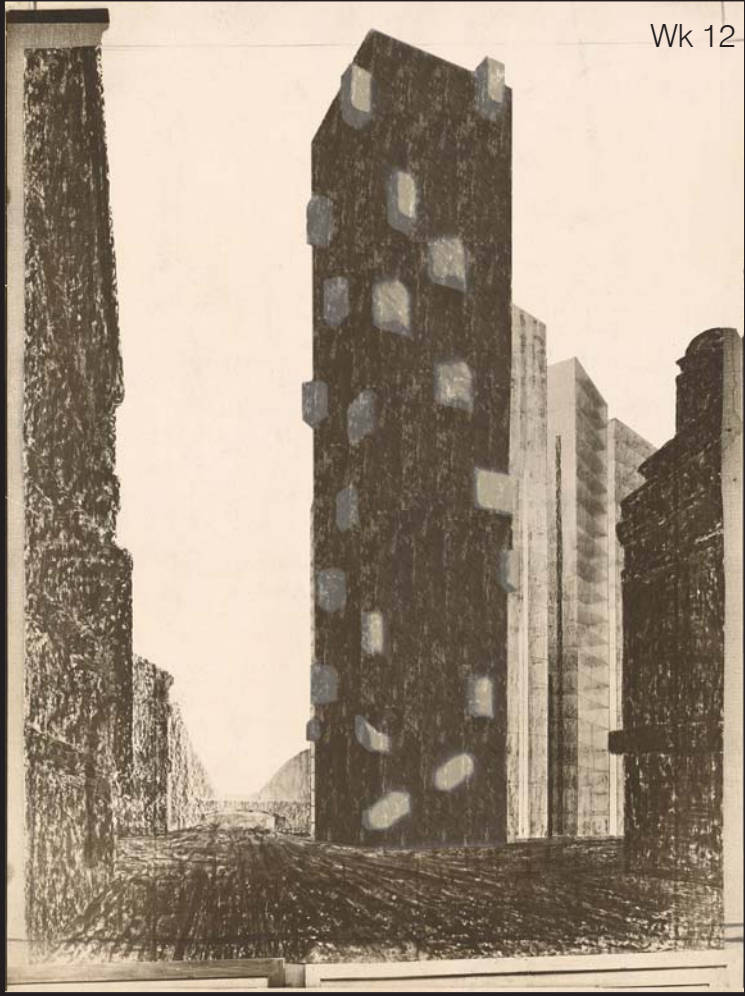
Wk 10

PRINCIPLES for effective wayfinding:

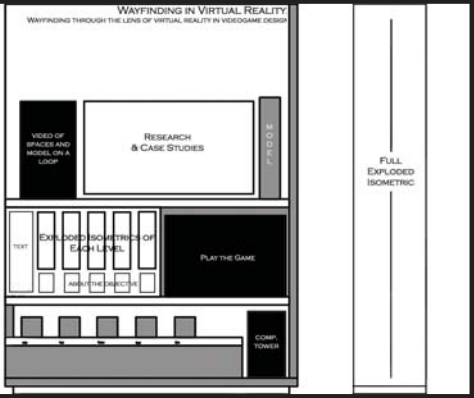
- Create an identity at each location, different from all others.
- Use landmarks to provide orientation cues and memorable locations.
- Create well-structured paths.
- Create regions of differing visual characters.
- Don't give the user too many choices in navigation.
- Use Survey views (give navigators a vista or map).
- Provide signs at decision points to help wayfinding decisions.
- Use sight lines to show what's ahead.

Wk 10

# Weeks 11-15

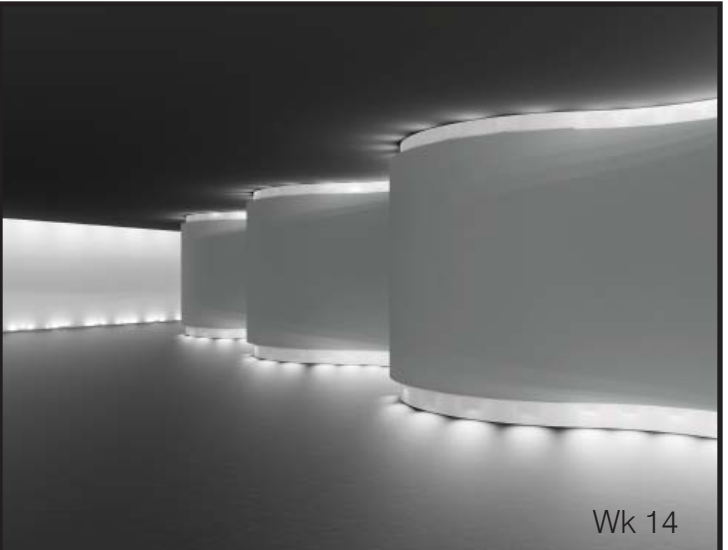


Wk 13

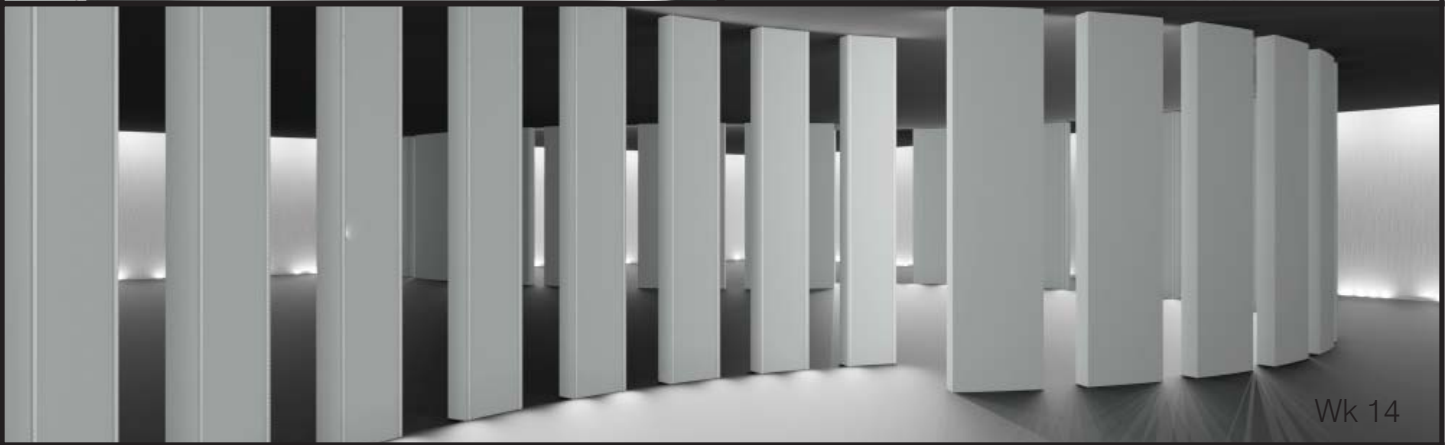




Wk 14



Wk 14



Wk 14

#### Wayfinding:

The act of finding one's way to a particular place; navigation.  
Oxford English Dictionary

#### Principles of Wayfinding:

- Create unique spaces that are memorable
- Create well-structured paths
- Do not create too many navigation choices
- Give the user a vista or a map
- Provide signs at decision points
- Show what is ahead

#### Why a Videogame?

The application of wayfinding within architecture and virtual reality stems from a curiosity about the crossover between the field of architecture and videogame design. Both are extremely creative professions and deal with designing immersive and functional environments for their users. Recently it has been more common to see crossover of the two disciplines which can only aid in the continuation of more imaginative end results.

#### Design Process:

The design process of creating these interior spaces in virtual reality is much different than the usual architectural design process. This process involves looking at a space from interior perspective views as an overall, and in turn, can become more formal architectural drawings such as floor plans and elevations rather than traditional design methods which usually are designed in an opposite order. Designing in this way allows for fusion of an architectural experience that can be explored through the virtual reality of a videogame, creating a crossover of wayfinding in architecture, videogames, and virtual reality design.

"This is a kind of expanded electronic paint box which allows you to occupy a virtual structure while you are building it, provided, of course, that you are wearing VR goggles. Technically, adding a 3rd dimension to a paint box may seem to be nothing more than just another feature. Conceptually, it is spellbinding because it creates a completely new epistemological condition. It is just as if you were able to physically occupy your own imagination outside your head."

Derrick de Kerckhove  
The Architecture of Intelligence

#### About the Videogame:

The videogame design is based around some of the most simplistic ideas and elements of architectural design, in order to both consciously and subliminally guide the user through each objective. These five elements are the line, the curve, pigment, volume, and texture. These specific components were chosen because they are experienced similarly in the senses of vision and sound in both reality and virtual reality. Since virtual reality is being used for the immersion experience of this game, vision and sound are the two major senses that will play significant factors in experiencing the virtual spaces.

Each objective occupies a virtual dimensional space of 100' by 100' by 100' creating perfect cubes of 8 levels. Those five objectives, one based on each architectural element, are then stacked on top of each other in a vertical fashion to create a tower, to symbolize moving up to the next objective. Each objective becomes slightly more difficult than the one before it in order to continually challenge the user and allow them to become more conscious of their virtual surroundings and the decisions they are making.



Wk 15

#### Objective One:

the line

The line is the most basic piece of framework that an architect can use in order to create an orderly space as well as allowing the user to see where they are headed. The line can be used to make a wall, align columns, or lead the eye or the person in a specific direction. The line is the easiest element to grasp the concept of and that is why it is the first element of the game. The user will learn quickly how the architectural elements will guide them throughout each objective.



#### Objective Two:

the curve

The element of the curve creates a way to mask what is just around the corner as well as making for a longer and more interesting path to getting there while still creating a simplistic path to the objective. The curve can be used to make the user travel slower due to not being able to see an end goal right away. The curve also allows for instances of multiple ways of getting to the same end point giving the user more options to get to where they are going.



#### Objective Three:

pigment

This pigment objective tests how the use of one color in an otherwise monotone space can help to guide the user through and allows for faster wayfinding. A single color is a simple way for a user to always know where they are and where they are going within a space. This is similarly seen in color coded parking ramps and other large monotonous spaces that one can easily get lost in.



#### Objective Four:

volume

The component of volume within architectural spaces can push and pull a user with a change as simple as lowering the ceiling or tightening the walls around the user in order to signal a specific way to travel or places not to go. This can be as simple as creating small, tight, uncomfortable spaces that the user does not want to explore, to large areas that leave the exploration quite open.



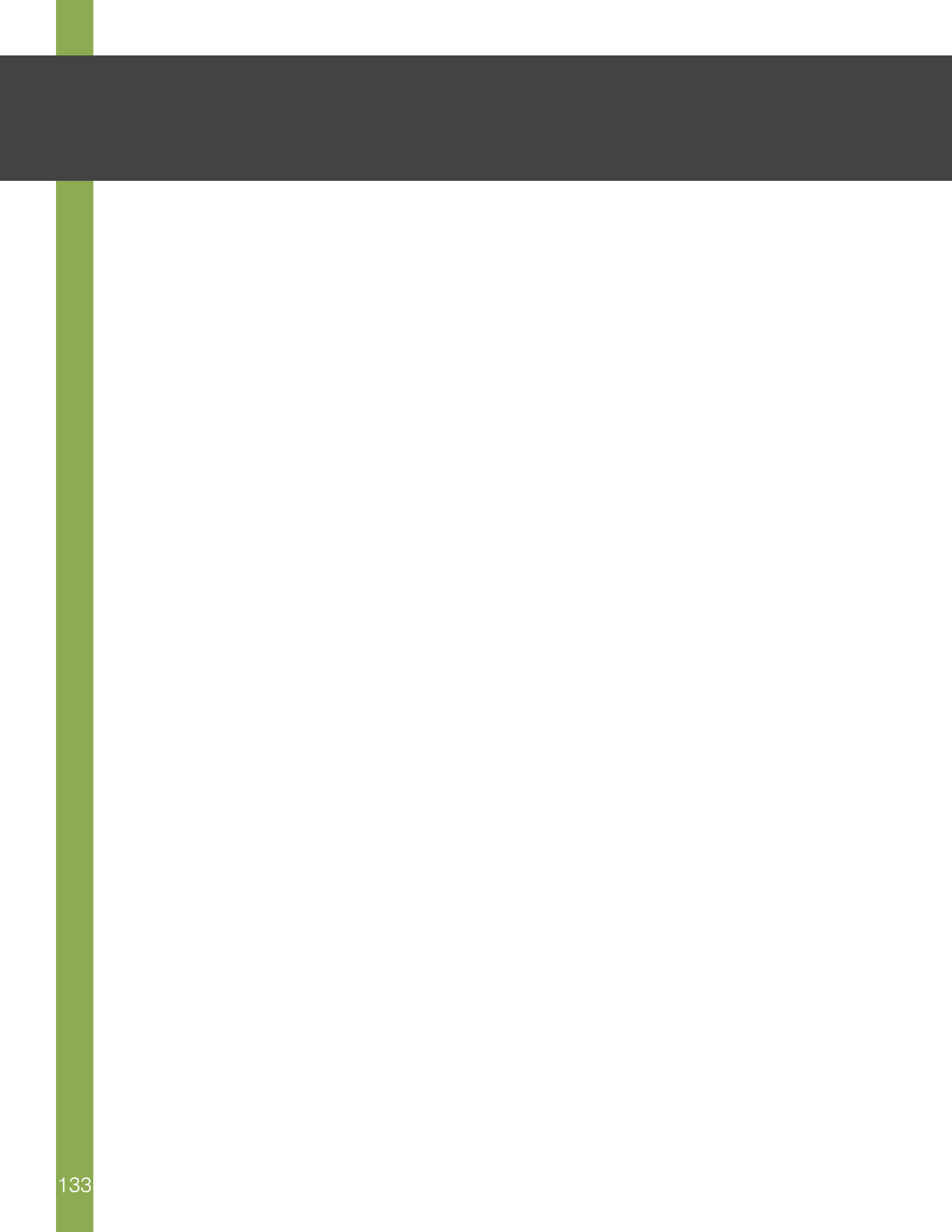
#### Objective Five:

texture

Texture in a virtual reality is sensed differently than in reality being as there is no sense of touch. The element of texture and its application within this videogame is that of a visual difference. Texture cannot only be felt, but can be seen as well. The idea of this objective is to have the user start to look at the details within architecture and how the difference in texture can help signal and guide them throughout spaces.

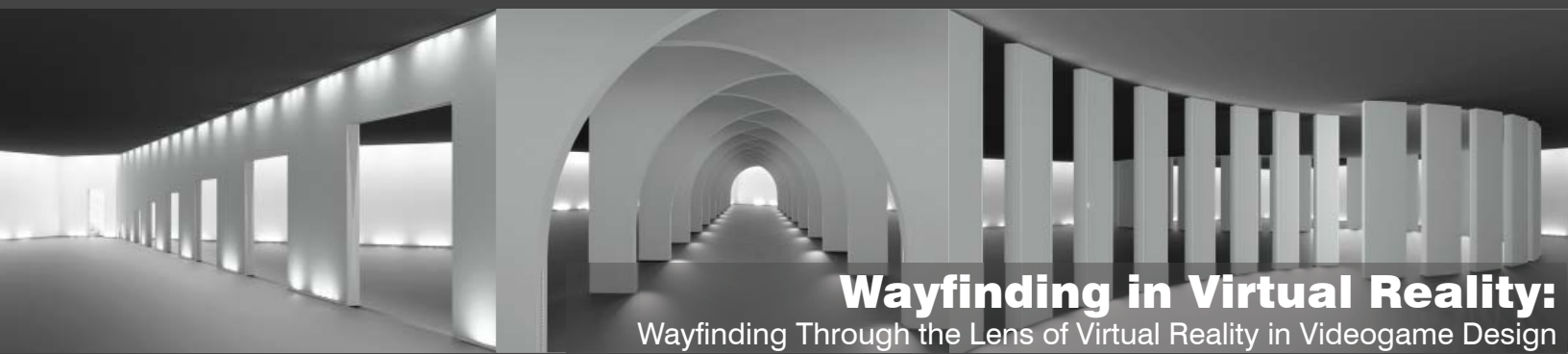






# Project Solution Documentation

The project and all solutions were documented in a variety of ways including software files, sketches in a sketchbook and collected readings compiled into a three ring binder. All of this information was then compiled into weekly folders and stored on a flash drive for the entirety of the last semester. All solutions moved on to the next week or were noted so that the information could be compiled at the end. Each day received a new Revit file re-saved with the date and was re-saved as a Fuzor file as well.



## Wayfinding in Virtual Reality: Wayfinding Through the Lens of Virtual Reality in Videogame Design

Master's of Architecture Thesis By Alyssa Zachman

### Wayfinding:

The act of finding one's way to a particular place; navigation.

Oxford English Dictionary

### Principles of Wayfinding:

- Create unique spaces that are memorable
- Create well-structured paths
- Do not create too many navigation choices
- Give the user a vista or a map
- Provide signs at decision points
- Show what is ahead

### Why a Videogame?

The application of wayfinding within architecture and virtual reality stems from a curiosity about the crossover between the field of architecture and videogame design. Both are extremely creative professions and deal with designing immersive and functional environments for their users. Recently it has been more common to see crossover of the two disciplines which can only aid in the continuation of more imaginative and results.

### Design Process:

The design process of creating these interior spaces in virtual reality is much different than the usual architectural design process. This process involves looking at a space from interior perspective views as an overall, and in turn, can become more formal architectural drawings such as floor plans and elevations rather than traditional design methods which usually are designed in an opposite order. Designing in this way allows for fruition of an architectural experience that can be explored through the virtual reality of a videogame, creating a crossover of wayfinding in architecture, videogames, and virtual reality design.

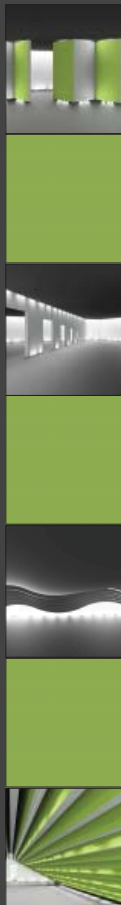
"This is a kind of expanded electronic paint box which allows you to occupy a virtual structure while you are building it, provided, of course, that you are wearing VR goggles. Technically, adding a 3rd dimension to a paint box may seem to be nothing more than just another feature. Consequently, it is spellbinding because it creates a completely new epistemological condition. It is just as if you were able to physically occupy your own imagination outside your head."

Detrick de Kretzweil  
The Architecture of Intelligence

### About the Videogame:

This videogame design is based around some of the most simplistic ideas and elements of architectural design, in order to both consciously and subliminally guide the user through each objective. These five elements are the line, the curve, pigment, volume, and texture. These specific components were chosen because they are experienced similarly in the senses of vision and sound in both reality and virtual reality. Since virtual reality is being used for the immersion experience of this game, vision and sound are the two major senses that will play significant factors in experiencing the virtual spaces.

Each objective occupies a virtual dimensional space of 100' by 100' by 100' creating perfect cubes of 8 levels. Those five objectives, one based on each architectural element, are then stacked on top of each other in a vertical fashion to create a tower to symbolize moving up to the next objective. Each objective becomes slightly more difficult than the one before it in order to continually challenge the user and allow them to become more conscious of their virtual surroundings and the decisions they are making.



### Objective One:

the line

The line is the most basic piece of framework that an architect can use in order to create an orderly space as well as allowing the user to see where they are headed. The line can be used to make a wall, align columns, or lead the eye or the person in a specific direction. The line is the easiest element to grasp the concept of and that is why it is the first element of the game. The user will learn quickly how the architectural elements will guide them throughout each objective.

### Objective Two:

the curve

The element of the curve creates a way to mask what is just around the corner as well as making for a longer and more interesting path to getting there while still creating a simplistic path to the objective. The curve can be used to make the user travel slower due to not being able to see an end goal right away. The curve also allows for instances of multiple ways of getting to the same end point giving the user more options to get to where they are going.

### Objective Three:

pigment

This pigment objective tests how the use of one color in an otherwise monotone space can help to guide the user through and allows for faster wayfinding. A single color is a simple way for a user to always know where they are and where they are going within a space. This is similarly seen in color coded parking ramps and other large monotonous spaces that one can easily get lost in.

### Objective Four:

volume

The component of volume within architectural spaces can push and pull a user with a change as simple as lowering the ceiling or tightening the walls around the user in order to signal a specific way to travel or places not to go. This can be as simple as creating small, tight uncomfortable spaces that the user does not want to explore, to large areas that leave the exploration quite open.

### Objective Five:

texture

Texture in a virtual reality is sensed differently than in reality being as there is no sense of touch. The element of texture and its application within this videogame is that of a visual difference. Texture cannot only be felt, but can be seen as well. The idea of this objective is to have the user start to look at the details within architecture and how the difference in texture can help signal and guide them throughout spaces.







### Response to the site or context:

Since this thesis technically has no site and any site all at once, that makes this response to site or context quite simple. This virtual setting that this digital building resides could be in any context and be altered to work anywhere or to be attempted on multiple sites at once to find the best option, that is the beauty of this software. The software, used as a tool to emulate anywhere on earth, can help to further understand exactly how any building could respond to any area or region. Within doing so, it can also be used to edit a building while still in the design phase to correct problems that may have not been foreseen any other way before construction. It is the theory behind this site with no site in virtual reality that allows for the way in which this thesis was designed (from the inside out) and facilitated that type of immersed creativity within the spaces.

The beauty of using virtual reality to design a building in general, allows the designers as well as the owner(s) to see what they may like or not like about the building and make changes as needed. This up and coming technology will assist designers in being more conscious of the site and how the building is set on the site as well as how they affect each other in a more immediate way.

Even though this is more theory than actuality, the idea behind this sort of virtual reality technology in design can be used for a variety of projects, both virtual and real.



# Performance Documentation

## Response to the Typological or Precedent Research

### Response to the typological or precedent research:

All of the precedent research that was done during both semesters was a huge part of the research that was accomplished in total. The videogame precedents that were studied in depth were The Witness, Bioshock Rapture, The Stanley Parable, and Assassin's Creed. All of these are different types of games, but all shared in the level of architecture and wayfinding methods present.

### What was learned from The Witness:

This design was particularly successful due to the particular team that was involved in its fruition. A moving, interactive video game is much more difficult to allow for the detailed quality of a rendered picture that an architect normally produces. This is an added challenge that must be embraced in order to create a successful game and all the designers on this team seemed to have stepped up and produced a quality, beautiful, and still fully functioning and interactive commodity.

### What was learned from Bioshock Rapture:

Although the idea of a futuristic/historic city under the sea is quite neat, there were some major flaws in the design of this game when it comes to the composition of architecture and the environment. There could have been much more done in order to reiterate and emphasize the underwater city and make for an even more sophisticated looking city. The use of some sort of building or structure designer could have been helpful on the team to make a more meaningful, realistic, and overall cohesive city. This is an example of how easy it is for building design and exterior elements to become an afterthought.

### What was learned from The Stanley Parable:

This free exploration game allows the user to choose their own fate within the realm of the game using both a narrator and the architecture to guide the user through the game, making it seem like they have infinite choices, while also only providing a small amount of real given choices. The choices that are given all have consequences and the user can try over and over again with a multitude of endings. This maze like exploration game allows the user to fully interact with the architecture and what it was intended to do.

### What was learned from Assassin's Creed:

Because many of the buildings that are used in this particular environment are existing or used to exist, they were technically designed by architects (some of them quite famous ones). The existing cities were organically developed quite successfully, and using this, the game developers knew that by using them, the navigation and success of the environment were already cued in. This was genius in the sense that it not only utilized the work of others, but also created a city that could be explored recognizably, just like the real city that it is based on.

After the videogame precedent research, real world buildings were researched to further study the methods of wayfinding within certain genres of buildings. These genres were casinos, museums, and airports. These helped to study the way in which architecture can be used to guide people through buildings in ways that are not forceful, but helpful and almost unnoticed in some cases.

### What was learned from casinos:

Overall, it is not the walls that define the open spaces, but instead the arrangement of the smaller furniture, machines, and tables. These can also be easily moved frequently in order to not make the spaces be familiar to frequent customers. There is always something new and different at the casino which can become part of the draw.

### What was learned from museums:

Museums are mostly interior architecture and the architecture is used in a way to help guide the guests throughout the building in a steady stream while allowing them to see everything that they want to see along the way. The best museums are the ones in which one can just keep walking and see everything without getting lost during the experience.

### What was learned from airports:

The success of navigating an airport is all about the layout and signage within. The more simple an airport layout is, with fewer choices on ways to go, or clear signage as to where exactly to go, the easier it will be to navigate. Radial layouts help even further to facilitate this due to the ability to see everything that is around.





# Performance Documentation

## Response to Goals and Project Emphasis

### Project Goals:

#### High Quality of Research

Convey the relevance of the topic by using VR and Videogame design as a platform for the exploration of wayfinding within a virtual architecturally designed environment

Present a clear analysis of the problem, the questions and the results

The use of investigative skills, design skills, and use of precedents for an overall well rounded thesis

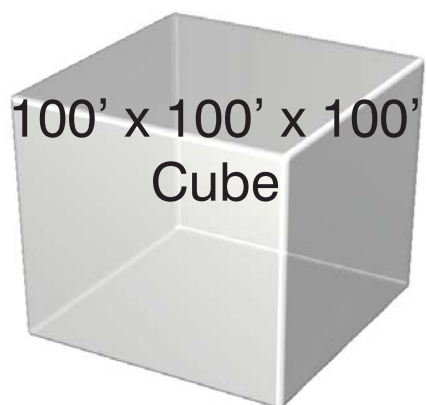
### Project Emphasis:

#### Wayfinding + Virtual Reality + Architecture + Videogame

Combining these four concepts into one thesis project with research, testing, and designing in the form of a videogame allowed for freedom of virtual design within limited set parameters allowed for full use of simple architectural elements to be used to aid in guiding users through the spaces.

The high quality research can be seen with the large number of analyzed case studies as well as the applied research in software for making the videogame. Wayfinding was harder to document when it came to allowing others to try the finished product and finding their way through the spaces on their own without the designer's help. It was interesting to see how people reacted to different elements and how they helped guide people though. Finally the question of : how can wayfinding and architecture be used to guide players though a building without using signs? This question was solved with the resultant design. Using these five simple elements of line, curve, pigment, volume, and texture allowed for things like columns, walls, ceilings, etc to push and guide people through out the spaces and allowed them to find the end.





## Five Basic Elements



This thesis aims to design an experience of wayfinding throughout interior architectural spaces using the platform of virtual reality as applied to a videogame. Finding the intended route through a videogame using simple architectural cues becomes the objective just like finding the way through a casino or a museum exhibition.

Instead of designing a space to fit within a defined building form, this thesis looks at designing from the inside based on user experience. This process involves looking at a space from interior perspective views as an overall, and in turn, can become more formal architectural drawings such as floor plans and elevations rather than traditional design methods which usually are designed in an opposite order. Designing in this way allows for fruition of an architectural experience that can be explored through the virtual reality of a videogame, creating a crossover of wayfinding in architecture, videogames, and virtual reality design.

## **Why a Videogame?**

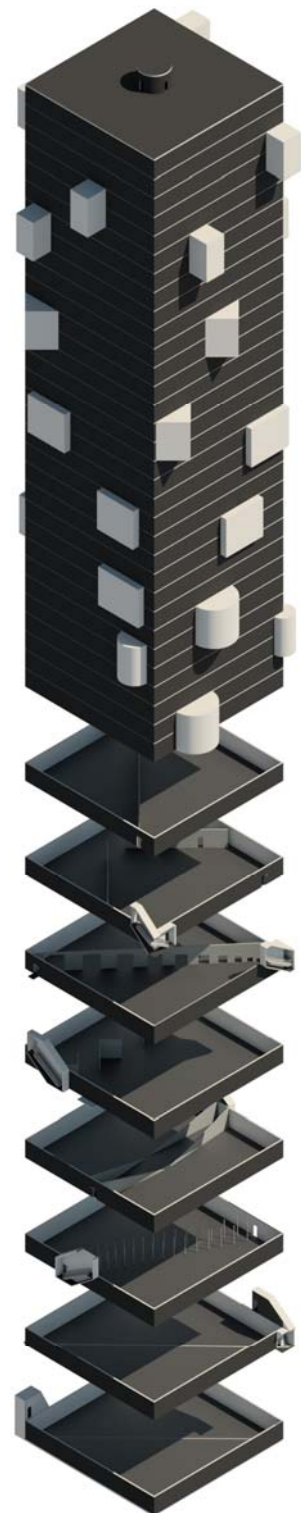
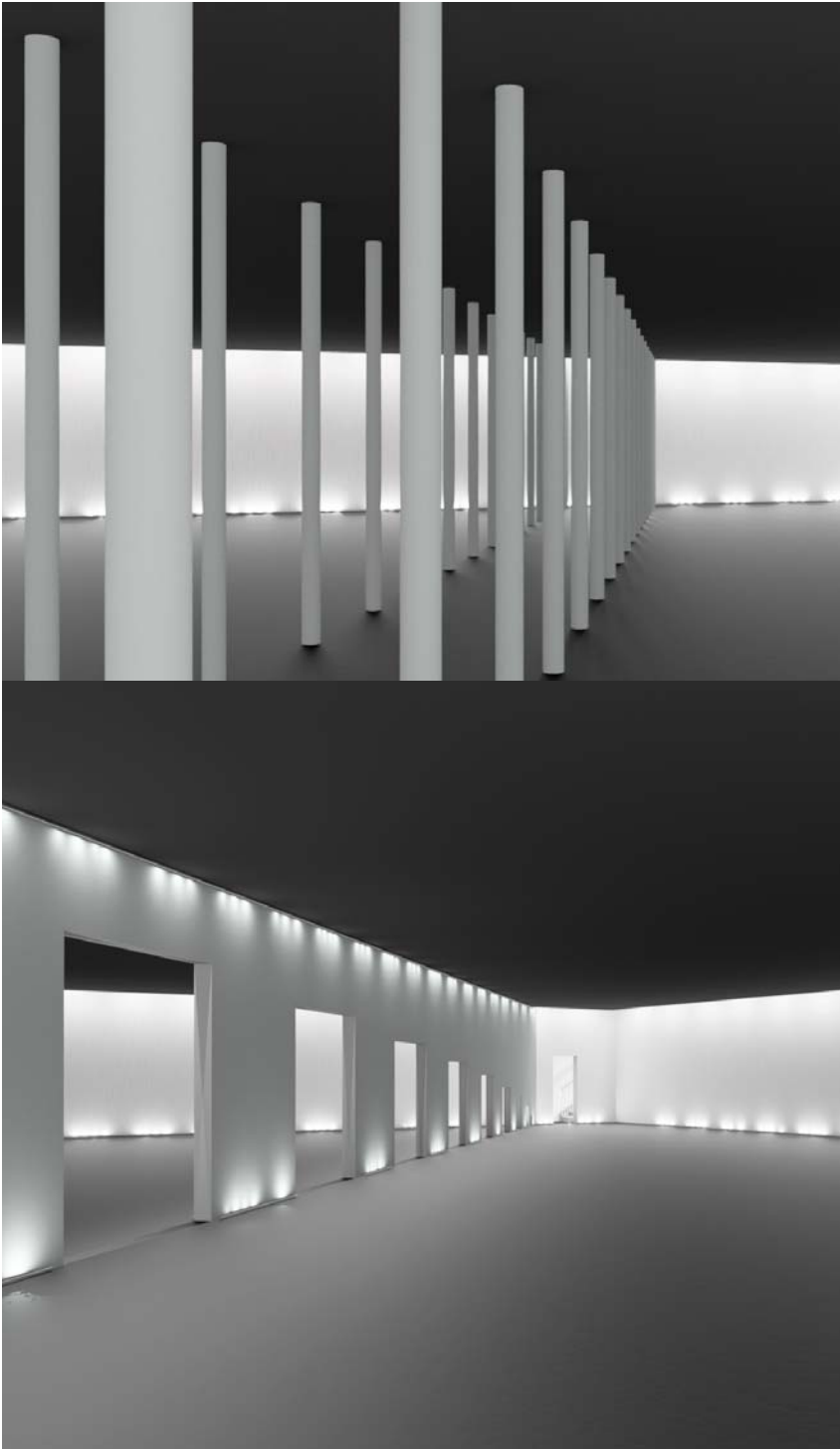
The application of wayfinding within architecture and virtual reality stems from a curiosity about the crossover between the field of architecture and videogame design. Both are extremely creative professions and deal with designing immersive and functional environments for their users. Recently it has been more common to see crossover of the two disciplines which can only aid in the continuation of more imaginative end results.



# Objective One

## the line

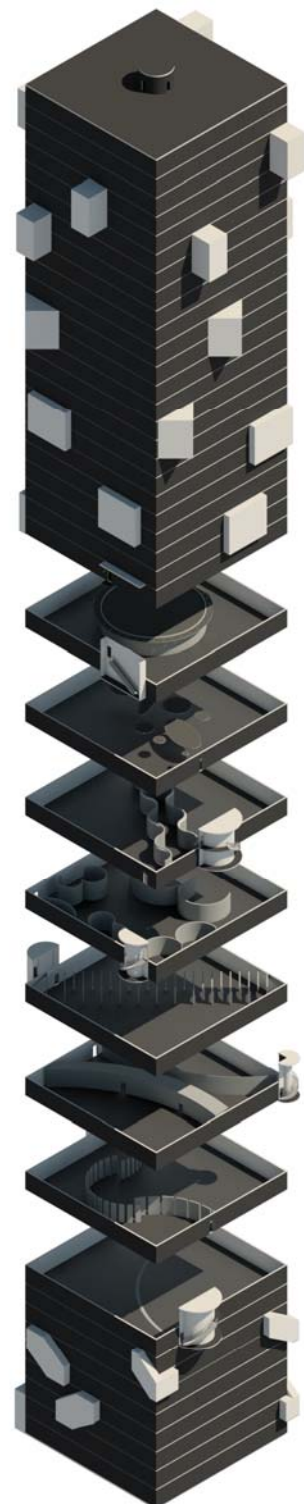
The line is the most basic piece of framework that an architect can use in order to create an orderly space as well as allowing the user to see where they are headed. The line can be used to make a wall, align columns, or lead the eye or the person in a specific direction. The line is the easiest element to grasp the concept of and that is why it is the first element of the game. The user will learn quickly how the architectural elements will guide them throughout each objective.



# Objective Two

## the curve

The element of the curve creates a way to mask what is just around the corner as well as making for a longer and more interesting path to getting there while still creating a simplistic path to the objective. The curve can be used to make the user travel slower due to not being able to see an end goal right away. The curve also allows for instances of multiple ways of getting to the same end point giving the user more options to get to where they are going.

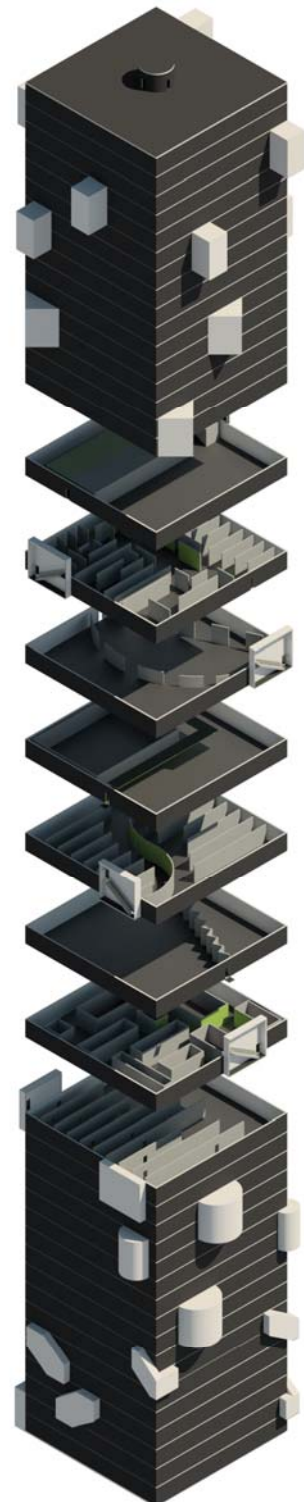




# Objective Three

## pigment

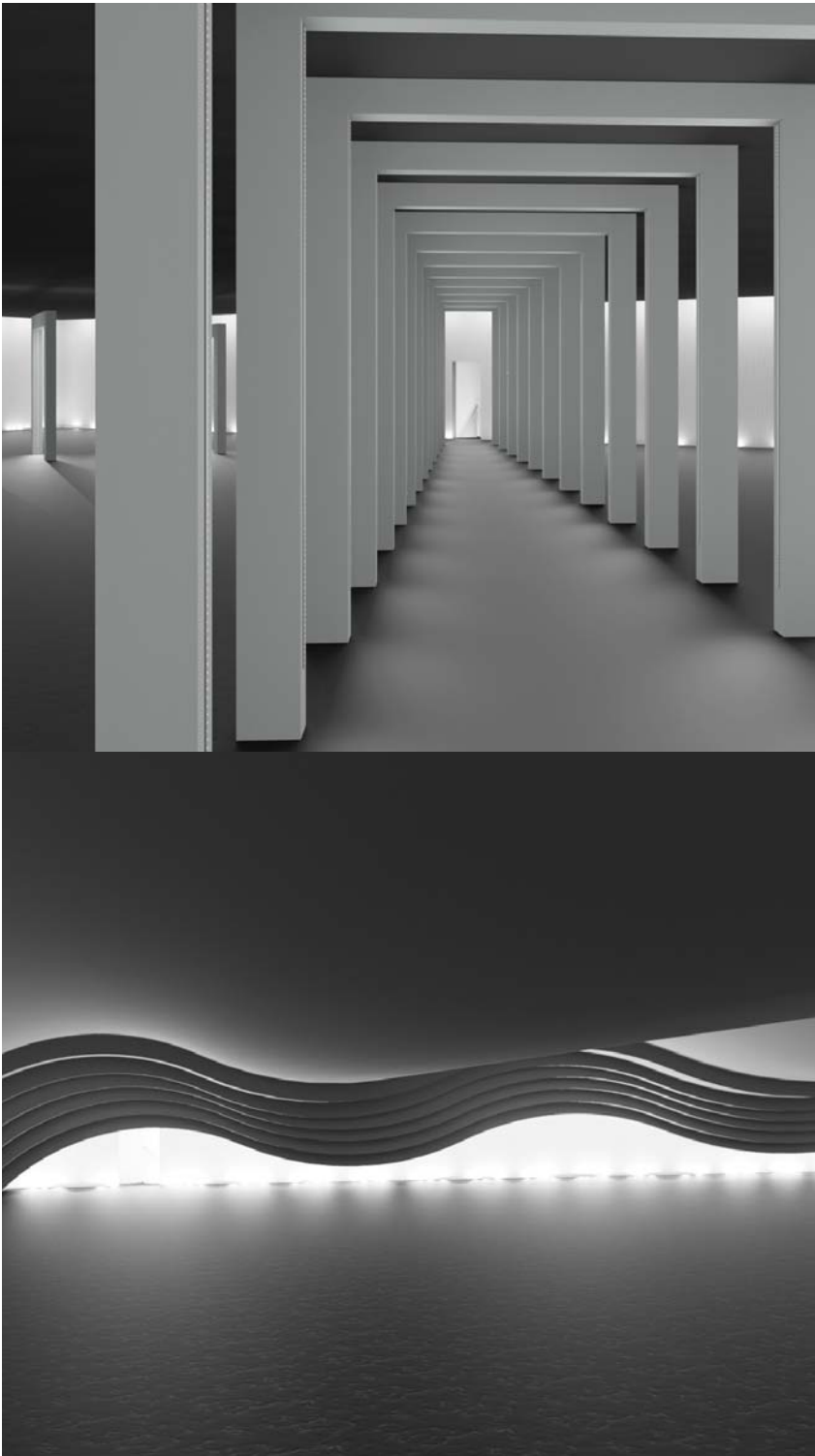
This pigment objective tests how the use of one color in an otherwise monotone space can help to guide the user through and allows for faster wayfinding. A single color is a simple way for a user to always know where they are and where they are going within a space. This is similarly seen in color coded parking ramps and other large monotonous spaces that one can easily get lost in.



# Objective Four

## volume

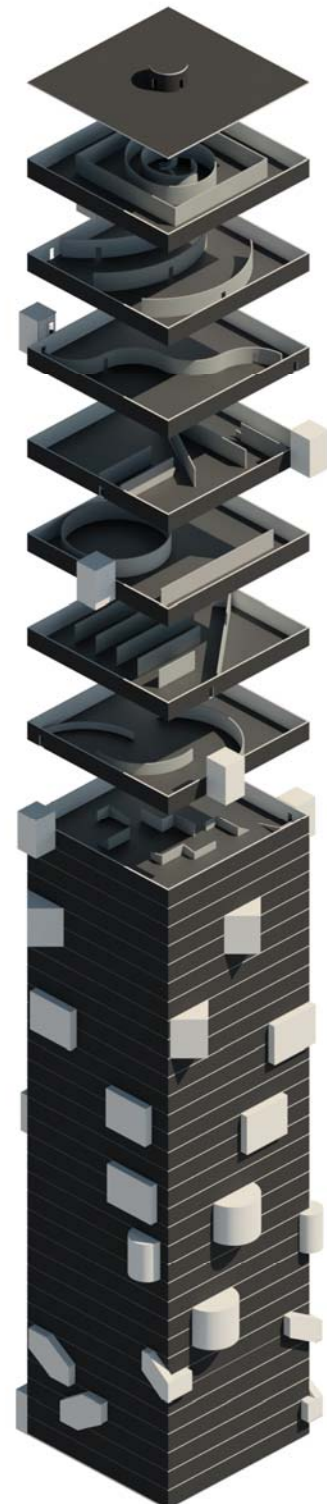
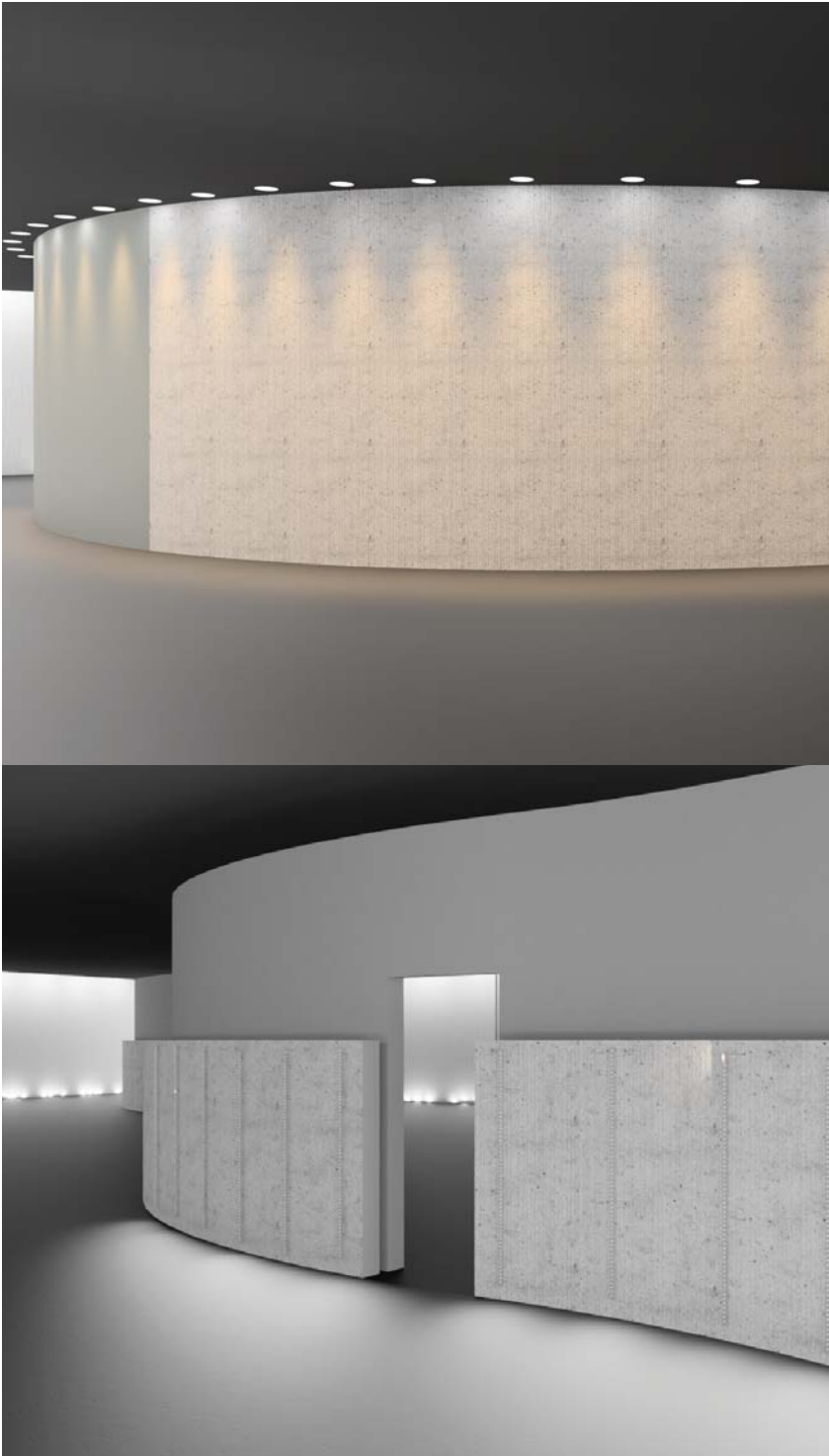
The component of volume within architectural spaces can push and pull a user with a change as simple as lowering the ceiling or tightening the walls around the user in order to signal a specific way to travel or places not to go. This can be as simple as creating small, tight, uncomfortable spaces that the user does not want to explore, to large areas that leave the exploration quite open.



# Objective Five

## texture

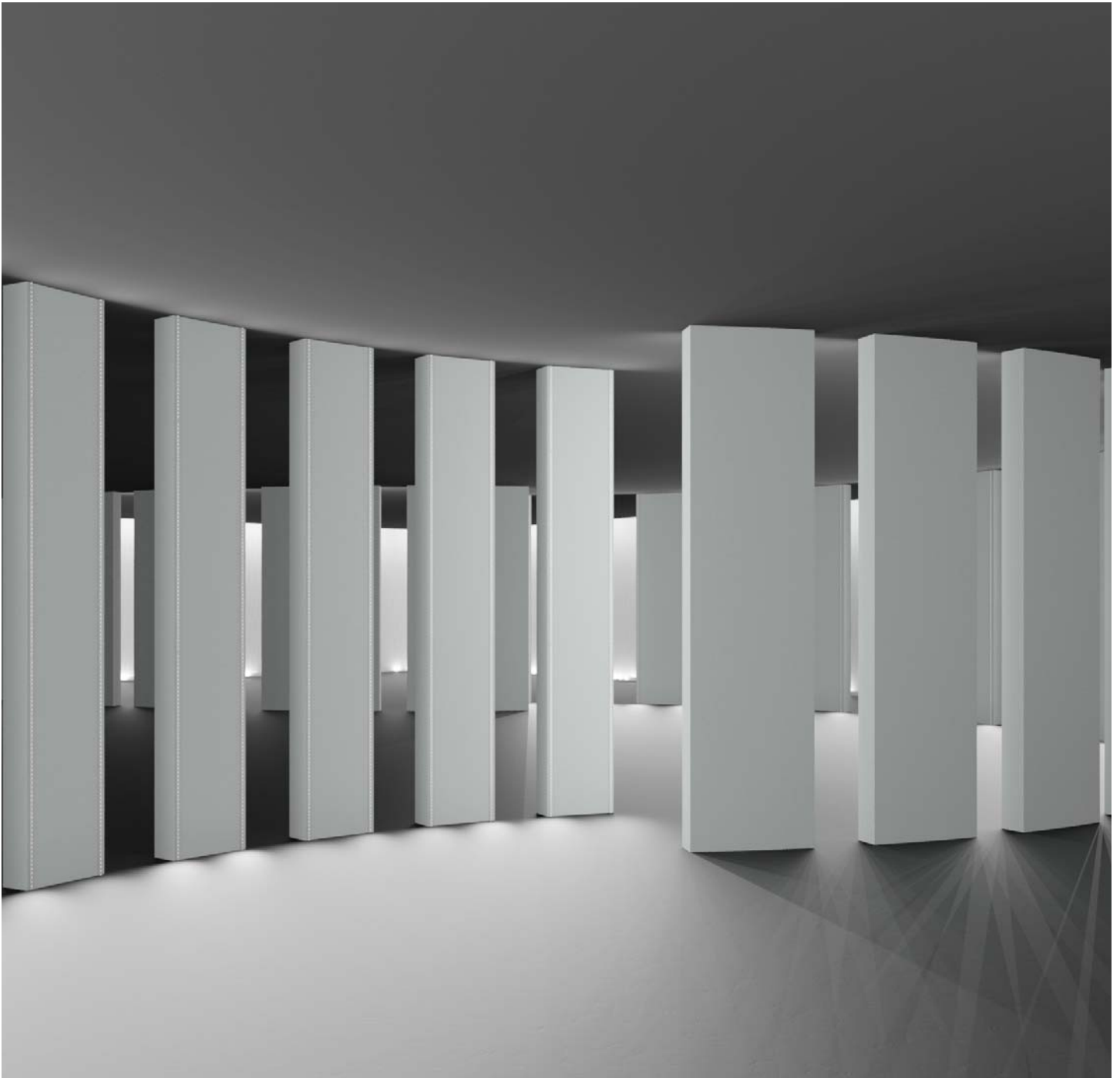
Texture in a virtual reality is sensed differently than in reality being as there is no sense of touch. The element of texture and its application within this videogame is that of a visual difference. Texture cannot only be felt, but can be seen as well. The idea of this objective is to have the user start to look at the details within architecture and how the difference in texture can help signal and guide them throughout spaces.



# Fusion Of:

- Architecture
- Wayfinding
- Videogame Design
- Virtual Reality

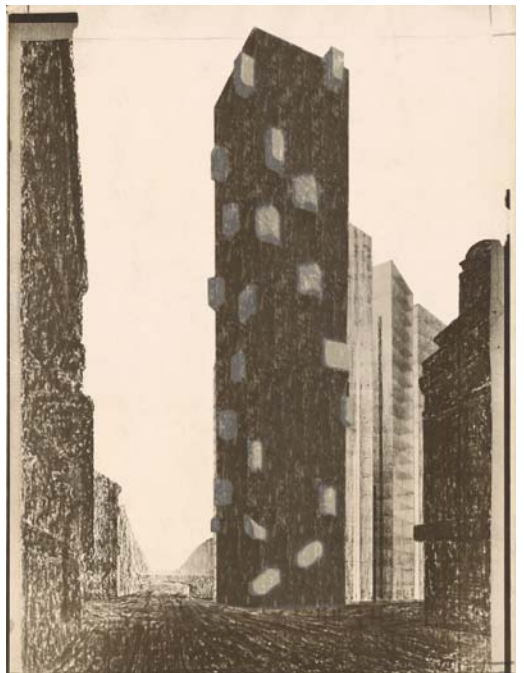
Brought together to create a videogame that takes the most basic elements of architecture and navigation to create a virtual experience, allowing the user to explore and test their navigation skills and the way that architectural components can lead a person through spaces to where they are meant to go.







Friedrichstrasse Tower in Charcoal  
-Ludwig Mies van der Rohe





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# Previous Studio Experience

At North Dakota State University

2013 Fall:

Tea House with Joan Vorderbruggen

This course kickstarted my ongoing analysis of the development of conceptual spaces and how one can feel within as well as spatial design and the overall design process. There was a heavy concentration on programming spaces and the space between them.

2014 Spring:

The narrative of the design and designing for a purpose was the large focus of the semester.

Each design decision was to have an intentional reason for doing so. This was also a semester that worked with group as well as individual pieces of a group project.

2014 Fall:

Cat Mausoleum and Shaker Barn Renovation with Ron Ramsay

The renovation of existing architecture was covered in the semester with the renovation of the shaker barn with all decisions made being centered around what this large building once was. The whole semester focused on our place in history and what we can do to preserve that and respect it.

2015 Spring:

Johnson Wax Laboratory and NDSU Library with Bakr Ali Ahmed

In this semester, we were finally given a list of spaces that was required in the buildings that we were designing as well as a few materials to focus on. The programmatic spaces necessary were provided and then we were to fit these into our design.

2015 Fall:

High Rise Capstone with David Crutchfield

In this course, the project was required to be a cumulative design project. This year was the first of high rise being a solo project instead of with partners and it really tested the ability to apply all knowledge of buildings we had to this singular project as a capstone.

2016 Spring:

Urban Design Studio and Marvin Windows Project with Don Faulkner

This semester focused on two things, designing a project quickly with a specific program and focusing on what windows can do for it and the second was about urban design. Being able to work as a group to design a whole city from scratch in a particular climate was an enlightening experience to know there are more options than just architecture on the horizon.

2016 Fall:

Wetlands Research Facility with Mark Barnhouse

This semester focused not only on a building that would be on protected and sensitive land, but also on what technology can do for a project in the field of architecture when it comes to seeing it as a final product of a movie walk through and seeing it as a three dimensional designed space.

2017 Spring:

Thesis with Michael Christenson

Thesis was an experience that no other studio gave me. That was the ability to focus on what I thought was important. The focused research and freedom allowed me to explore the crossover that architecture can have in other fields and media. It was an experience that will never be forgotten and will continue to grow after school is over.

# Personal Identification

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# Final Display

